

NIGERIA

ANNUAL

MEDICAL AND SANITARY
REPORT

FOR THE YEAR

1929.



22497

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REPORT

FOR THE
YEAR 1929.

No. D/DMS.

DIRECTOR OF MEDICAL & SANITARY SERVICE,

LAGOS, NIGERIA,

17th April, 1930.

ANNUAL MEDICAL AND SANITARY REPORT, 1929.

SIR,

I have the honour to submit for the information of His Excellency the Governor and for transmission to the Right Honourable the Secretary of State the Medical Report on the Health and Sanitary conditions of Nigeria for the year 1929, together with the Returns, etc., appended thereto.

I have the honour to be,

Sir,

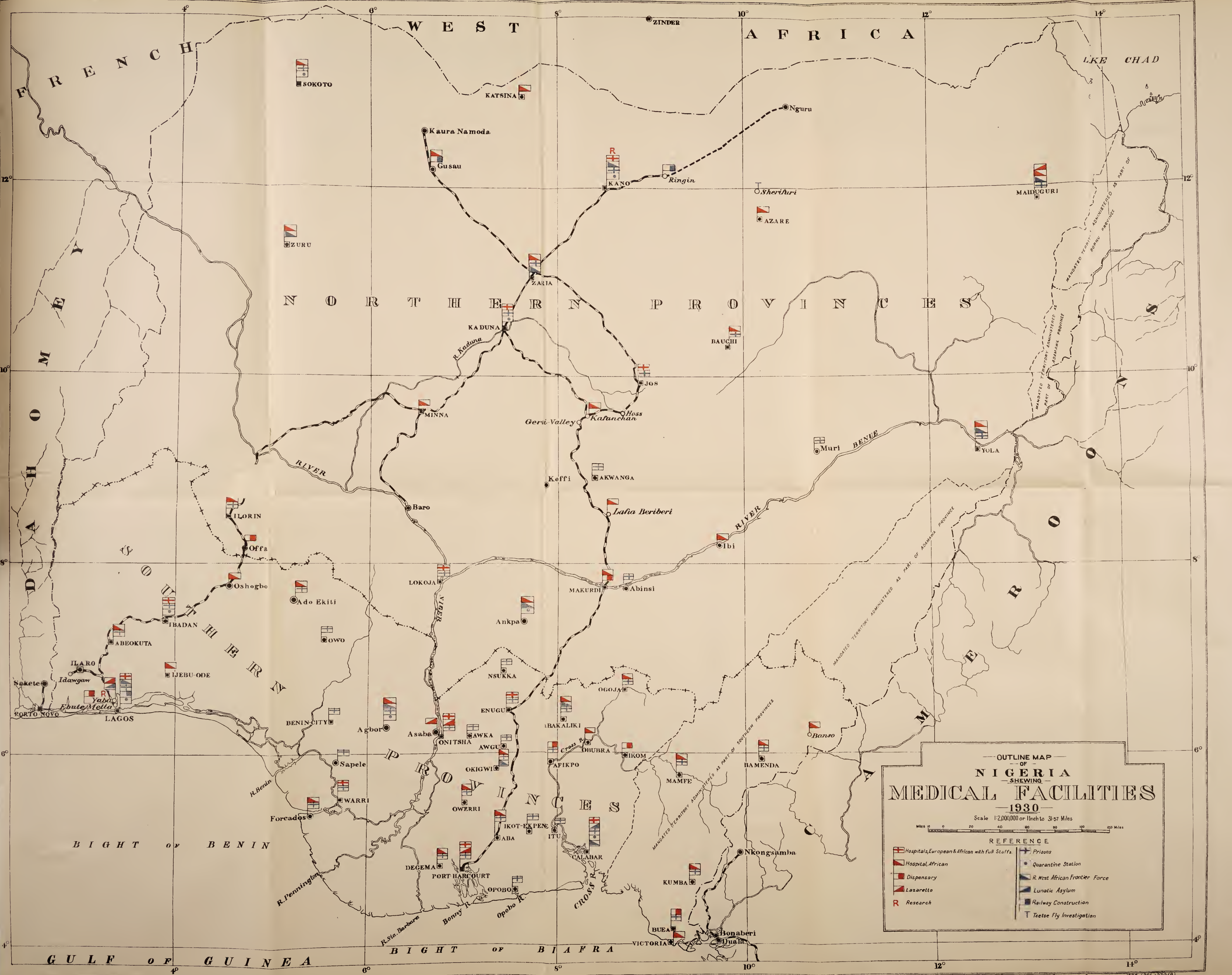
Your obedient Servant,

W. B. JOHNSON,
Director of Medical and Sanitary Service.

THE HONOURABLE

THE CHIEF SECRETARY TO THE GOVERNMENT,

LAGOS.



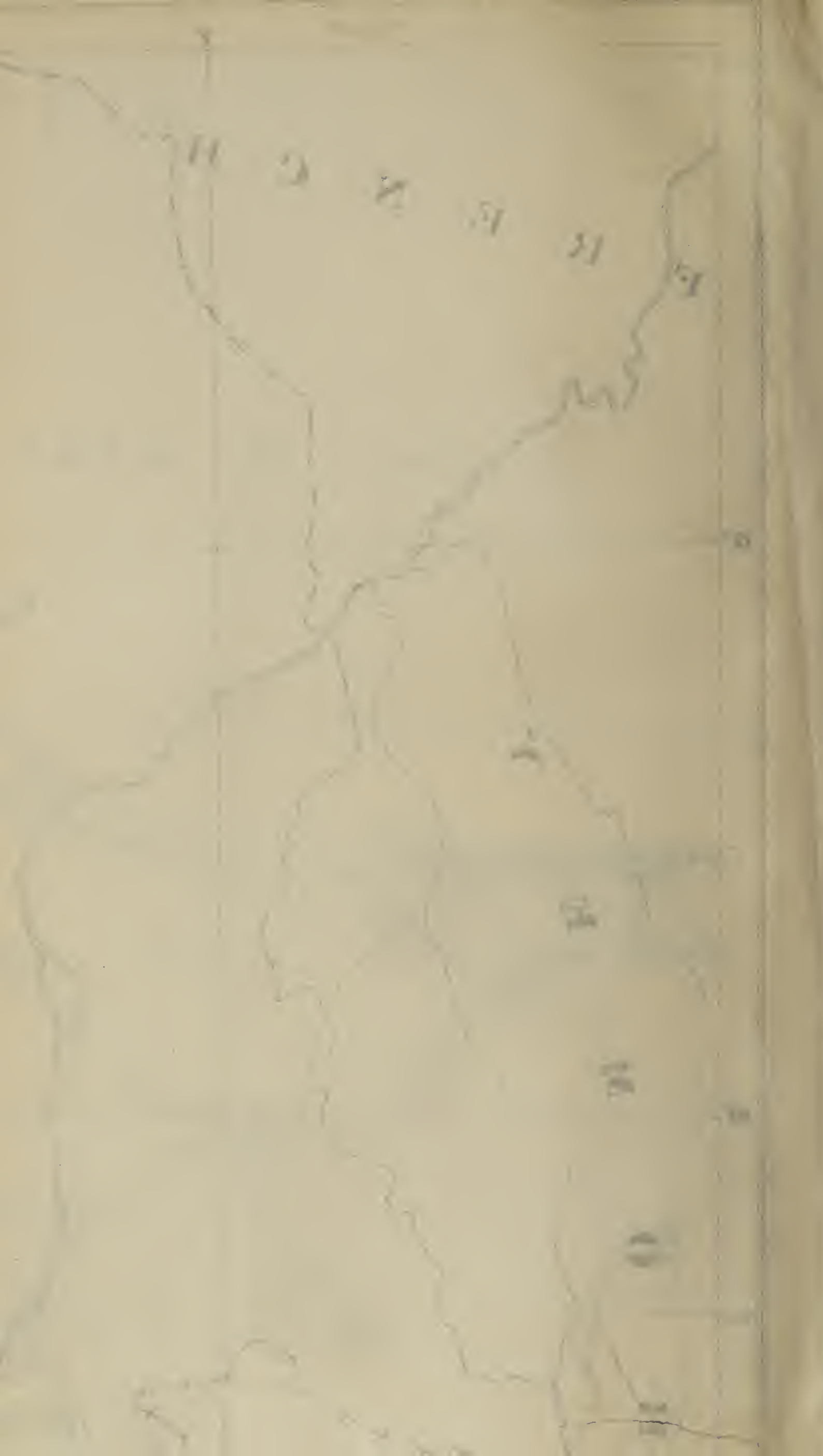
OUTLINE MAP
— OF —
NIGERIA
— SHEWING —
MEDICAL FACILITIES
— 1930 —

Scale 1:2,000,000 or 1 inch to 31.57 Miles

Miles 0 20 40 60 80 100 120

REFERENCE

Hospitals, European & African with full Staffs	Prisons
Hospital, African	Quarantine Station
Dispensary	R. West African Frontier Force
Lazaretto	Lunatic Asylum
Research	Railway Construction
	Tsetse Fly Investigation



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Annual Medical and Sanitary Report on Nigeria for the Year ending 31st December, 1929.

I.—ADMINISTRATION.

A.—ESTABLISHMENT (including vacancies).

(a) EUROPEAN STAFF.

MEDICAL.

- Director of the Medical and Sanitary Service.
- Deputy Director of Medical Service.
- 2 Assistant Directors of Medical and Sanitary Service.
- 4 Assistant Directors of Medical Service.
- 5 Specialist Medical Officers.
- 11 Senior Medical Officers.
- 6 Pathologists (two vacancies).
- 1 Alienist Medical Officer.
- 1 Research Medical Officer.
- 1 Superintendent of the Dispensers' Training School.
- 97 Medical Officers (eleven vacancies).
- 3 Lady Medical Officers.
- 2 Government Dentists.
- 1 Pharmacist.

CLERICAL.

- 1 Assistant Accountant.
- 1 Office Assistant.
- 3 Chief Dispenser Storekeepers.

NURSING.

- 2 Matrons.
- 9 Senior Nursing Sisters.
- 51 Nursing Sisters.

TSETSE INVESTIGATION (Temporary).

- 1 Tsetse Investigator.
- 1 Entomologist.
- 1 Immunologist.
- 2 Medical Officers (seconded from Medical Staff).

MEDICAL RESEARCH.

- 1 Director of Medical Research Institute.
- 2 Bacteriologists.
- 1 Entomologist (seconded to Tsetse Investigation).
- 1 Immunologist (seconded to Tsetse Investigation).
- 3 Technical Assistants.

SANITATION.

- 1 Deputy Director of Sanitary Service.
- 1 Assistant Director of Sanitary Service.
- 5 Senior Sanitary Officers.
- 13 Medical Officers of Health (Twelve provided and Eleven appointed).
- 33 Sanitary Inspectors (Thirty-one appointed).

SPECIAL PLAGUE STAFF.

- 2 Majors, R.A.M.C.
- 2 Non-Commissioned Officers.
- 24 Rodent Inspectors.

(b) AFRICAN STAFF.

MEDICAL.

- 6 Medical Officers (three vacancies).
- 2 Junior Medical Officers (Temporary Appointments).
- 1 Assistant Accountant.
- 1 Chief Clerk.
- 4 Assistant Chief Clerks.
- 12 First Class Clerks.
- 35 Second Class Clerks and Probationers.
- 2 Chief Dispensers.
- 7 Senior Dispensers.
- 20 First Class Dispensers.
- 70 Second Class Dispensers.
- 25 Dispensers-in-Training.
- 1 Chief Storekeeper.
- 2 Assistant Chief Storekeepers.
- 3 First Class Storekeepers.
- 5 Second Class Storekeepers.
- 11 Senior Nurses (Seven provided).
- 24 Charge Nurses.
- 58 First Class Nurses.
- 140 Second Class Nurses.
- 170 Nurses-in-Training.
- 1 Senior Laboratory Attendant (unfilled).
- 3 First Class Laboratory Attendants (one provided).
- 5 Second Class Laboratory Attendants (four provided).
- 10 Third Class Laboratory Attendants (eight provided).
- 1 Charge Attendant, Lunatic Asylum.
- 25 Attendants, Lunatic Asylum.
- 3 Senior Wardens.
- 10 Wardens.
- 2 Assistant Wardens.
- 10 Attendants, Leper Asylum.

SANITATION.

- 2 Chief Sanitary Inspectors (None appointed).
- 5 Senior Sanitary Inspectors (None appointed).
- 10 First Class Sanitary Inspectors (six appointed).
- 46 Second Class Sanitary Inspectors.
- 33 Third Class Sanitary Inspectors.
- 64 Vaccinators.
- 1 Registrar of Vital Statistics.
- 2 Deputy Registrars of Vital Statistics.
- 1 Assistant Chief Clerk.
- 3 First Class Clerks.
- 15 Second Class Clerks and Probationers.
- 2 Second Class Dispensers.
- 1 Charge Nurse.
- 4 First Class Nurses (Provision for two).
- 10 Second Class Nurses (Provision for seven).

B.—LIST OF ORDINANCES, REGULATIONS, ETC., AFFECTING PUBLIC HEALTH ENACTED DURING THE YEAR.

ORDINANCES.

Serial No.	Date.	Short Title and Application.	
7/1929	17.10.1929	Ordinance to amend the Quarantine Ordinance.	
14/1929	17.10.1929	Ordinance to amend the Poisons and Pharmacy Ordinance.	

ORDERS-IN-COUNCIL.

Serial No.	Date.	Ordinance made under.	Provision.
8/1929	11.3.1929	The Townships Ordinance.	Ordering the Cul-de-Sac which branches off Egerton Street, Calabar and adjoins the property of the Roman Catholic Convent be closed unconditionally on the ground that it is unnecessary.
19/1929	12.8.1929	The Public Health Ordinance (Chap. 56).	Ordering amendment of Order No. 33 of 1917 published in Gazette of 27/12/17 by deleting therefrom the words and figure "(9) The station Flagstaff at Ifon".
26/1929	4.11.1929	The Public Health Ordinance (Chap. 56).	Ordering the provisions of the Public Health Ordinance and the rules made thereunder to apply and to be in force in (a) the area which prior to the 27th June, 1929, constituted the township of Itu (b) the area which prior to the 27th June, 1929, constituted the township of Oron.
27/1929	23.12.1929	The Dangerous Drugs Ordinance, 1927 (No. 16 of 1927).	Ordering under section 13 (2) of the Dangerous Drugs Ordinance, 1927, Part III of the Ordinance shall apply to Esters of Morphine and their respective salts, and to any preparation, admixture and extract containing any of the said Esters. This order applies to the British Cameroons as well as to the rest of the Protectorate and the Colony.

ORDERS-IN-COUNCIL,—*continued*.

Serial No.	Date.	Ordinance made under.	Provision.
1/1929	21.1.1929	The Lagos Township Ordinance.	Ordering the township of Lagos to be divided into A, B, & C. Wards.
3/1929	28.1.1929	The Dangerous Drugs Ordinance, 1927.	Ordering and regulating the sale and distribution of Raw Opium and Coco leaves and laying down conditions as to giving and dispensing of Prescriptions.
8/1929	11.3.1929	Hospital Fees Ordinance.	Amending Regulation 2 of Hospital Fees Regulation 1925 by inserting the words. "European hospitals at Enugu and Makurdi (Benue Bridge Construction)" after the word "Kaduna" and by inserting "Makurdi, Aba, Ijebu Ode and Oshogbo" after "Victoria".
		RULES, 1929.	
5/1929	30.8.1929	Townships Ordinance.	Ordering that no person at Enugu Township shall hawk goods or set up a stall or table or otherwise display goods for sale in any street or open space (other than the market) not being the property of a private owner without a permit from the Local Authority.
9/1929	30.11.1929	Townships Ordinance.	Cancellation of Rule No. 3 of 1921 published in the Gazette of 14th July, 1921.

C.—FINANCIAL.

Revenue £10,802 6s.

Expenditure £427,629

The total Medical and Sanitary Expenditure for the year 1929 of £427,629 is about a sixteenth of the Estimated General Expenditure for 1929/30.

In addition to this expenditure, details of which are given under Table II of Returns on page 54, the Native Administrations spent considerable sums upon Medical work. In the Northern Provinces this amounted to £25,556 or 1/48 of the Total Native Administration Expenditure for the Northern Provinces.

II.—PUBLIC HEALTH.

A.—GENERAL REMARKS.

Each year shows a satisfactory increase of the number of African patients who are seeking medical assistance. This increase is a marked feature in both the Northern and Southern Provinces.

The following table shows the comparison with previous years :—

	1927.	1928.	1929.
(a)			
European In-patients	1,315	1,553	1,470
Non-European In-patients	26,896	29,173	32,068
European Out-patients	6,456	8,629	8,181
Non-European Out-patients	272,483	354,191	391,008
Major Operations	3,227	5,441	4,311
Minor Operations	4,853	4,186	8,113
(b) <i>Northern Provinces.</i>			
African In-patients	10,461	10,904	12,907
African Out-patients	71,816	87,476	119,624
(c) <i>Southern Provinces and Cameroons.</i>			
African Out-patients	255,964	266,615	271,384
African In-patients	16,435	18,269	19,161

During 1929 the shortage of European staff which has so crippled the Medical Department since the war has been made good to a considerable extent. At the beginning of the year extreme difficulty was experienced owing to the depleted staff, but twenty new Medical Officers were appointed during the year. This more than made good loss by retirements and at the end of the year the Medical branch of the service showed only eleven vacancies. The staff of the Health branch was also brought up to strength and the full number of thirteen Medical Officers of Health will have been appointed by March 1930 (one being seconded to the Lagos Town Council. One new appointment was made to the rank of Pathologist and two more are expected early in 1930. One Immunologist was appointed and seconded to the Tsetse Investigation. This increase of staff actually appointed has enabled new stations to be opened at Kafanchan and Laña, Beriberi, and the re-opening of stations which had been closed down. It has also enabled the posts of Travelling Medical Officers to be filled and these officers are now on duty in Sokoto, Zaria, Kano and Bornu Provinces. An extra Medical Officer has also been posted to Oyo Province for travelling duty.

The importance of training an increased staff of African personnel in order to extend the service of modern medicine to the bulk of the population has long been recognised. The school of Pharmacy at Lagos and the school for Sanitary Inspectors at Lagos are teaching as many pupils as they can deal with. Progress is being made with the scheme for training African Medical Assistants which was described in the Report for 1927. The first class of boys at King's College, Lagos, will have completed three years' higher general education in September, 1930. Twelve of these lads will commence medical study, comprising Zoology, Botany and Organic Chemistry, at the Lagos African Hospital where one complete floor of the Pathological Laboratory is being converted into lecture rooms and laboratories for their use. In the Northern Provinces the first class of boys holding medical scholarships will come to the Medical Department early in 1930. It was decided that these lads have not quite reached a standard of education requisite for work as Medical Assistants and the first class will therefore be absorbed into the new school of Pharmacy which will be opened at Zaria.

A report upon the work of the school of Pharmacy at Lagos appears in Appendix No. G. The standard of work at this school is high and there is now keen competition to enter it. The new buildings for this school are nearing completion. They have been built on the site of the proposed Medical College at Yaba, near Lagos, and consist of two large buildings for use as laboratories and lecture rooms, a hostel with dormitory and dining room, two quarters for Dispensers attached to the staff and a bungalow for the European Pharmacist. The ground space allows room for a football ground for the students and for expansion of laboratories as required for the Medical School.

At Zaria the new buildings constructed near the new African Hospital for the purpose of an Infectious Diseases Hospital have been appropriated and fitted for use as the new school of Pharmacy, an Infectious Diseases Hospital upon a more simple plan being constructed upon another site. This school has excellent laboratories and lecture rooms and a hostel is being built upon a plan of separate compounds under one roof which will afford accommodation for married students. A bungalow has been built for the European Pharmacist who will be in charge of the school.

An attempt to improve and standardise the courses of training of all branches of the subordinate medical staff was made by the appointment of a Committee of the staff who prepared syllabuses for use at all training centres for Dispensers, Sanitary Inspectors, Nurses, Laboratory Attendants, Midwives and Native Administration Dispensary Attendants. These syllabuses may be modified as the result of experience, but as they may be of use for comparison in other Colonies they have been included under Appendix No. 1.

Much preparatory work has been done in connection with a scheme for the introduction of a system of widely-scattered dispensaries, built and maintained by Native Administrations. A certain number of such institutions exist already but it has been realised that a great extension of the system is essential if any successful attempt is to be made to reach the bulk of the 19,000,000 Africans who populate Nigeria. At present an attempt to extend the sphere of European medicine is being made by means of a system of Travelling Medical Officers but although these officers have done excellent work there are two drawbacks to such a system—(i) the Travelling Medical Officers cannot leave their patients under treatment when they move to their next objective and (ii) it is obviously too costly and impossible to provide medical service for this vast population with a staff of European Medical Officers. The scheme has been prepared with the advantage that we have for our use the experience gained in other Colonies, more particularly that of the dispensary system of the great Concession Companies in the Belgian Congo, the system of Tribal Dressers in Tanganyika, and the system of dispensaries in Uganda. The plan was discussed in detail at the Residents' Conferences held this year in the Northern and Southern Provinces and it received the warm support of the Administrative Service.

The essential features are :—

1. We must plan always one year ahead in order to allow training of staff, building and equipment of the new dispensaries. Expansion of the scheme will be provincial, each Resident deciding according to the local resources and desire of the Chiefs as to the number of new dispensaries required each year.

2. The Dispensary Attendants will be trained at recognised hospital centres upon strictly standard lines to use a strictly standardised set of drugs and dressings. Training will be for one year and the instruction will be repeated again and again during the year. They will be taught comparatively few things but the teaching will be reiterated until it has sunk in. The standardisation of drugs and dressings will simplify the training and also the indenting for supplies. The lads will be taught to give intra-muscular injections of a Bismuth preparation for

treatment of yaws and syphilis. The strict standardisation insisted upon above was suggested by the success of this system in the training of African staff for the Forminiere Company in the Congo. The syllabus and standard equipment is shown in Appendix No. 3.

3. The drugs used will be effective but no dangerous drugs will be employed.

4. The dispensaries will be under supervision by Travelling Medical Officers or by the Medical Officers of the District.

5. Record of diseases and attendances will be kept in a simplified register, printed in Hausa for the Northern Provinces.

The scheme is considered to be of such importance that two Assistant Directors of Medical Service, one for the Northern Provinces and one for the Southern Provinces have been detailed for travelling work in connection with the scheme. These officers will be responsible for the scheme in their respective spheres. They will arrange local details with Residents and will have access to the Lieutenant-Governors. They can thus co-ordinate the scheme while at the same time they can keep it provincial, which is necessary owing to the varying conditions in different parts of the country of which the experience of the Residents is our best guide. Considerable progress has been made and training of staff will commence at hospital centres in April, 1930, while plans for opening further centres are continued. The Emirs and Chiefs welcome the scheme with enthusiasm, and there can be no doubt that it will lead to a great expansion of the sphere of influence of European medicine.

The staff of the Medical Research Institute and the staff of Clinical Pathologists have been re-organised to form one service to be called the Laboratory Service. As this re-organisation will not take effect until April, 1930, the details of the scheme may be postponed with the report for that year.

Some delay has been experienced in completing the new X-ray Departments at Kaduna and at Port Harcourt but these will be opened during 1930. Suitable buildings and apparatus will then be available at Lagos, Kaduna and Port Harcourt while an efficient but smaller plant will be in use at Calabar. The report of the X-ray Department at Lagos is incorporated in Appendix No. F.

The two matrons recently appointed assumed duty in 1929. Their tours of inspections will lead to improved organisation of hospital staff and equipment and will tend to standardise the conditions in different stations.

With the appointment of an Assistant Director of Medical and Sanitary Service for the Southern Provinces, a re-organisation of the administrative staff has been made. The old centre division of the Southern Provinces with Warri as Headquarters has been abolished. This division will be administered through the Assistant Director of Medical and Sanitary Service, Enugu and its medical stores will be supplied from the Lagos Store. The administrative staff is now distributed as follows:—

Headquarters, Lagos:

- Director of Medical and Sanitary Service.
- Deputy Director of Medical Service.
- Deputy Director of Sanitary Service.
- Assistant Director of Sanitary Service.
- Medical Store.

Northern Provinces—Headquarters, Kaduna:

- Assistant Director of Medical and Sanitary Service.
- Assistant Director of Medical Service (travelling duty in connection with Native Administration medical work).
- Senior Sanitary Officer.
- Medical Store.

Southern Provinces—Headquarters, Enugu:

Assistant Director of Medical and Sanitary Service.

Assistant Director of Medical Service (travelling duty in connection with Native Administration medical work).

Senior Sanitary Officer.

Medical Stores at Port Harcourt and Calabar.

Reliefs:

Two Assistant Directors of Medical Service.

This scheme improves the Provincial Administration by sparing one Assistant Director of Medical Service and one Senior Sanitary Officer from the headquarter office. The senior officers of the Headquarters at Lagos will be relieved by their deputies, and the deputies by a Senior Medical Officer or Senior Sanitary Officer in order to avoid dislocation of the Provincial Administrative staff.

At the same time a closer co-operation of Medical and Sanitary branches in all offices has been brought about, both branches using the same clerical sections—Accounts, Typing, etc., which has again led to an economy of personnel at the Headquarters office.

(I) GENERAL DISEASES.

A return of diseases and deaths for 1929 is shown in Tables IV and V. The incidence of disease groups is shown in diagramatic form.

A feature of interest is the increasing number of cases of malignant disease which are being diagnosed in African patients. This may be due partly to the fact that in early years the class of patient attending hospitals was mainly composed of Government employees, soldiers, police, labourers, etc., in the prime of life, whereas very much greater use is now made of the hospital facilities by the general population. The wider scope of clinical pathological laboratories accounts for more accurate diagnosis and so increases the number of cases reported. During 1929, 214 cases of malignant new growth were diagnosed and 1,348 benign tumours were treated. The types of neoplasm which have come to notice are commented upon under Appendices A, C, D.

45,667 cases of various injuries were treated during the year. Of these there were 190 dislocations, 1,741 sprains and 875 fractures of bones. The increase of motor traffic upon main roads has led to a marked increase of this type of case. Injuries in mines, by machinery, in Railway accidents, etc., gave 4,126 cases.

Various forms of skin diseases account for a number of the cases treated. Thus 6,365 cases of tinea and 7,507 cases of scabies came under treatment. Tropical ulcer is a terrible scourge in Nigeria, 36,319 cases being treated during the year. The work of the Research Medical Officer at Kano tends to show that tropical ulcer is a specific complaint, caused by the fusiform bacillus, but that a previous skin lesion, traumatic or otherwise, forms the source of entry of the organism and that any debilitating conditions more particularly malnutrition, syphilis, yaws, ankylostomiasis, etc., are important predisposing causes.

This leads to the important questions of dietetic deficiencies in African races. These are almost certainly of the utmost importance in leading to a lowered resistance to all forms of infection. The work of Dr. McCulloch has proved that the grain-eating people of the Northern Provinces suffer from a serious deficiency of protein and of salts, and also probably of vitamins. Plans have been made to enable research into dietetic deficiencies to be carried out. Work has been commenced at Kaduna, in the gaol, and will be continued at Katsina. Co-operation has been established between the Pathologist engaged upon this research and the workers at the experimental cattle farm of the Agricultural Department. At Sherifuri a similar investigation is in progress upon the dietetic factor in resistance of animals towards trypanosome infection.

Diseases of the eye require more investigation by officers experienced in this branch of medical science. During the year under review 10,163 cases of eye diseases came under treatment. Of these 231 cases of trachoma were diagnosed, 155 of these being from the Northern Provinces, chiefly from the dry sandy areas of Sokoto and Katsina. In addition to the figures given above 393 cases of gonorrhoeal ophthalmia were treated. An interesting report upon an ophthalmic clinic established by Dr. Savage at Port Harcourt gives an indication of the type of cases which require attention, and may be quoted :—

CASES TREATED DURING SIX MONTHS JUNE-DECEMBER.

1. Trauma	...	...	...	...	11
2. Conjunctivitis	...	...	...	...	37
3. Entropion due to trachomatous scarring	...				1
4. Corneal ulceration and keratitis	...	...	...	...	15
5. Diseases of uveal tract	...	...	...	...	14
6. Diseases of the lens	...	...	...	...	6
7. Diseases of retina and optic nerve	...	...	...	...	50
8. Refractive errors	...	...	...	...	8
9. Chronic glaucoma	...	...	...	...	2

NOTES.

(2) *Conjunctivitis*.—In most cases no organisms found. In three cases an organism apparently kochs weeks bacillus was present. In two cases morax-axenfeld bacillus found. In a few cases the gonococcus was found, sometimes in not very severe cases.

(4) Three cases of corneal ulceration due to yaws in the acute stage were noted. In each case there was evidence of recent yaws infection, from 2-8 months previously. Each case showed small circular infiltration in the deep layer of the cornea. In two cases the infiltration broke down giving rise to a small ulcer; in one case resolution occurred without ulceration. The condition was unilateral. The condition cleared up under local and general treatment. One case of ring ulceration of the cornea was noted, a ring of small opacities being arranged concentrically with the edge of the cornea. The aetiology could not be ascertained but the condition responded favourably to treatment.

(6) Six cases of cataract were treated, only one being of the common senile type. Uveitis accounted for four cases and trauma for one.

(7) In this group two cases of primary optic atrophy, one case of secondary optic atrophy and one case of neuro-retinitis occurred. The remainder of the cases comprised a group conveniently termed toxic amblyopia. This condition is exceedingly common and occurs chiefly but not exclusively in male adolescents. Ophthalmoscopic examination of the fundus usually reveals nothing at all. The condition is essentially a central scotoma, usually negative but occasionally as far as it is possible to understand the subjective symptoms the scotoma is positive in nature.

The aetiology of the condition is obscure. There are rarely evidences of syphilis or yaws, and many cases give no history of infection. In Lagos, where laboratory investigation was possible, the Sachs George reaction was negative in many cases. Many patients have recently arrived in the district and attribute their condition to "change of air". It is just conceivable, therefore, some vitamin deficiency consequent on a change of diet, is responsible for the condition. In many cases an ichthyotic condition of the angles of the mouth and sometimes of the eyes as well—a condition which is sometimes attributed by natives themselves and also by others of more authority, to eating of starchy foods—has been observed in these patients.

Considerable improvement often follows general lines of treatment, especially in early cases.

Eye Conditions in Leprosy.—Of 124 lepers examined in the Leper Settlement, sixteen showed eye lesions directly attributable to leprosy. These cases occurred almost exclusively in nodular or mixed cases. They consisted chiefly of chronic iritis and various forms of keratitis. Such incidental conditions as leprous infiltrations of the eyelids were not included in this number.

(II) COMMUNICABLE DISEASES.

(a) *Mosquito or Insect Borne.*

Malaria.—Preventive measures against malaria are described under Section III.

The Medical Officer of Health, Lagos, reports that 101 deaths from malaria were certified in Lagos during the year, the figures of death from malaria in Lagos being in successive years :—

1926.	1927.	1928.	1929.
130	... 131	... 73	... 101

In Lagos ninety-five *per cent.* of the children examined were found to harbour malarial parasites in their blood. The figures for the incidence of malaria as shown from hospital attendances for Nigeria during 1929 are as follows :—

				No. of Cases.	Deaths.
EUROPEANS.					
Malaria	...	...	...	1,336	5
Blackwater	...	...	...	15	8
AFRICANS AND OTHER NON-EUROPEANS.					
Malaria	...	...	...	23,001	43
Blackwater	...	...	...	5	1

The majority of Europeans take five grains of quinine daily as prophylactic.

Blackwater Fever.—Fifteen cases with eight deaths occurred in Europeans; five cases with one death in non-Europeans. These cases are analysed in Appendix A.

Trypanosomiasis.—(a) Tsetse investigation—During the year the Tsetse Investigation Staff moved into the new Laboratory at Gadau, near Sherifuri, and the team has been strengthened by the addition of an Immunologist and a Veterinary Pathologist. Dr. Lloyd who joined the Investigation at its commencement in 1921 retired to take up an appointment in England. His loss will be keenly felt. A full report of field experiments and laboratory research appears in Appendix B.

(b) *Sleeping Sickness.*—In the Northern Provinces this disease is causing anxiety. 3,629 new cases were treated during the year by the Sleeping Sickness Officers attached to the Investigation and 1,748 cases were treated at other hospitals, twelve cases occurring in Europeans. A report describing endemic and epidemic areas is given in Appendix B. The area involved is so extensive that it is now realised that a staff of African Assistants is required in order to carry out treatment under supervision of the Medical Officers and a start has been made to engage and train this assistant staff. Preliminary training is undertaken at the Gadau Camp and the lads will then be attached to the Travelling Sleeping Sickness Officers. The staff of four Medical Officers detailed for sleeping sickness duty has been maintained during a great part of the year.

In the Buea-Victoria area of the Mandated Territory of the Cameroons there is some evidence of spread of infection, seven cases in Europeans and 118 African cases being reported during the year. The doctor employed by the Planters' Union is doing good work and an additional Medical Officer has now been detailed for the work.

A circular, prepared by the Tsetse Investigator upon lines similar to that issued in Uganda, giving information concerning diagnosis and treatment of sleeping sickness, has been printed and circulated to all Medical Officers and to medical missions. A standard sleeping sickness treatment card has also been printed and issued. Arrangements have been made for the Senior Sleeping Sickness Officer to visit the Yaunde Province in the French Cameroons to study the campaign organised in this district where the disease is epidemic. A report has been submitted by Dr. Johnson describing work upon sleeping sickness and tsetse control deserved during a journey through the Belgian Congo, Tanganyika, Uganda and the Sudan.

Relapsing Fever.—This disease now appears to be endemic and no serious outbreaks occurred. 145 cases with twenty-three deaths were reported in Africans. These figures include two mild outbreaks in the Southern Provinces—at Owerri (thirty-five cases with no deaths) and at Oshogbo (forty-four cases with no deaths).

Plague and Yellow Fever are dealt with under Section III.

(b) *Infectious Diseases.*

Tetanus.—Sixty-four cases with thirty-three deaths were reported in Africans and one case (recovered) in an European.

Dysentery.—Improved laboratory facilities have led to the more accurate estimation of the number of cases of bacillary dysentery which occur as compared with the amoebic form. An interesting report upon the bacillary strains obtained in Lagos is incorporated in Appendix A. It will be of considerable interest to watch the result of the introduction of a pipe-borne water supply to such large native cities as Kano where large numbers of cases come under treatment each year. In Lagos, where a pipe-borne water supply has been in use since 1912, 121 cases of dysentery were reported but it must be remembered that this figure does not include numerous cases which have recourse to the native medicine man. It may be mentioned in this connection that in Lagos large numbers of native medicine men are practising herbalism and have banded themselves into societies for the practice of this art. The table below shows the cases of dysentery reported during the year.

DYSENTERY CASES, 1927, 1928, 1929.

		EUROPEAN.			AFRICAN.		
		1927.	1928.	1929.	1927.	1928.	1929.
Amoebic	Cases ...	122	125	111	2,614	2,465	2,826
	Deaths	—	—	—	120	76	83
Bacillary	Cases ...	3	12	36	240	255	220
	Deaths	—	—	1	21	22	22
Undefined	Cases ...	5	21	22	348	962	1,011
	Deaths	—	—	—	18	22	53
Liver Abscess	Cases ...	13	10	14	102	65	112
	Deaths	1	—	—	6	4	7
Total Cases ...		143	168	183	3,304	3,747	4,169
Total Deaths ...		1	—	1	165	124	165

Venereal Diseases and Yaws.—It is convenient to include yaws in this section owing to the close resemblance of the tertiary manifestations of syphilis and yaws. The figures for African patients who have come under treatment for the past three years are as follows :—

	1927.	1928.	1929.
Yaws	16,952	29,079	42,126
Syphilis	8,516	12,915	15,828
Gonorrhoea	7,012	8,927	12,018

Throughout the whole of the eastern part of the Southern Provinces and the central part of the Mandated Territory yaws is almost universal and the demand for treatment on the part of the people is extraordinary. As one proceeds north the yaws rate diminishes and that of syphilis increases. In the western part of the Southern Provinces also yaws is comparatively less common. The relative percentage of incidence of syphilis and yaws, as gathered from attendances at treatment centres in different parts of the country, is shown in graph No. 1. A reference to the map at the end of this report will show the geographical position of the stations named.

With regard to the incidence of gonorrhœa, the figures are less reliable. Generally speaking, the gonorrhœal infection rate is high in the Southern Provinces and the syphilis rate is low whereas in the Northern Provinces the syphilis rate is high. The actual gonorrhœa rate is, however, difficult to obtain. The African regards this disease as trivial and seldom comes voluntarily to the European Medical Officer for treatment except in case of complications. Native remedies are universal and, consisting as they do of decoctions containing essential oils together with instructions to imbibe large quantities of fluid, are reasonably effective. The attitude of the African towards gonococcal infection is illustrated by a belief which is common among uneducated classes of the Yoruba people that a man cannot propagate his species until he has suffered from this disease.

The comparative incidence of syphilitic and gonococcal infection, as reported from hospitals and dispensaries, is shown in graph No. 2.

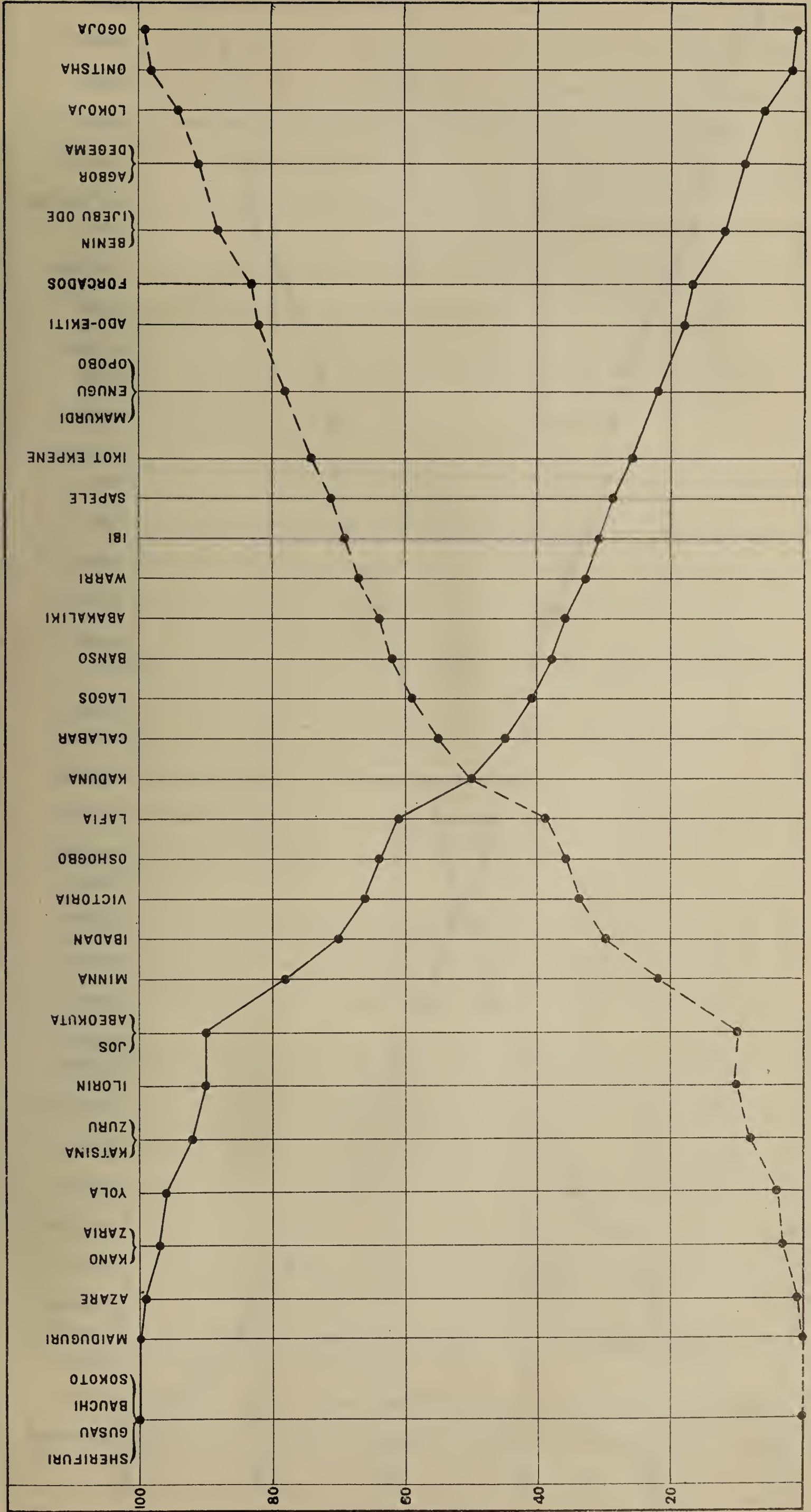
Gonococcal infection amongst the troops has been lowered considerably by the establishment of early treatment (prophylactic) centres at all barracks.

As regards treatment there can be no doubt that the intensive campaign which has been carried out against yaws in the south-east part of Nigeria in recent years has led to a marked improvement. It is hoped that the scheme of Native Administration dispensaries, described elsewhere, with an African staff trained to give bismuth injections will still further diminish the incidence of yaws.

The gradual change which has occurred in the Nigerian Medical Service from being a service for Europeans and " barracks " only to that of a universal service for the African population has left us without any very definite plans of campaign against venereal diseases and yaws. We have nothing to compare with the work of the Sudan sleeping sickness force when the latter tackled the treatment of yaws upon a grand scale. In order to obtain data upon which our campaign might be more fully organised a questionnaire was sent to all Medical Officers to obtain information upon the work already in progress. Every reply received emphasised the fact that efficient treatment of the African is almost impossible unless restrictive measures are employed.

Most Medical Officers favour a course of treatment based upon the Rochester Row system, but complain that it is impossible to carry on treatment after the clinical symptoms have ameliorated. This applies

COMPARATIVE INCIDENCE OF SYPHILIS AND YAWS

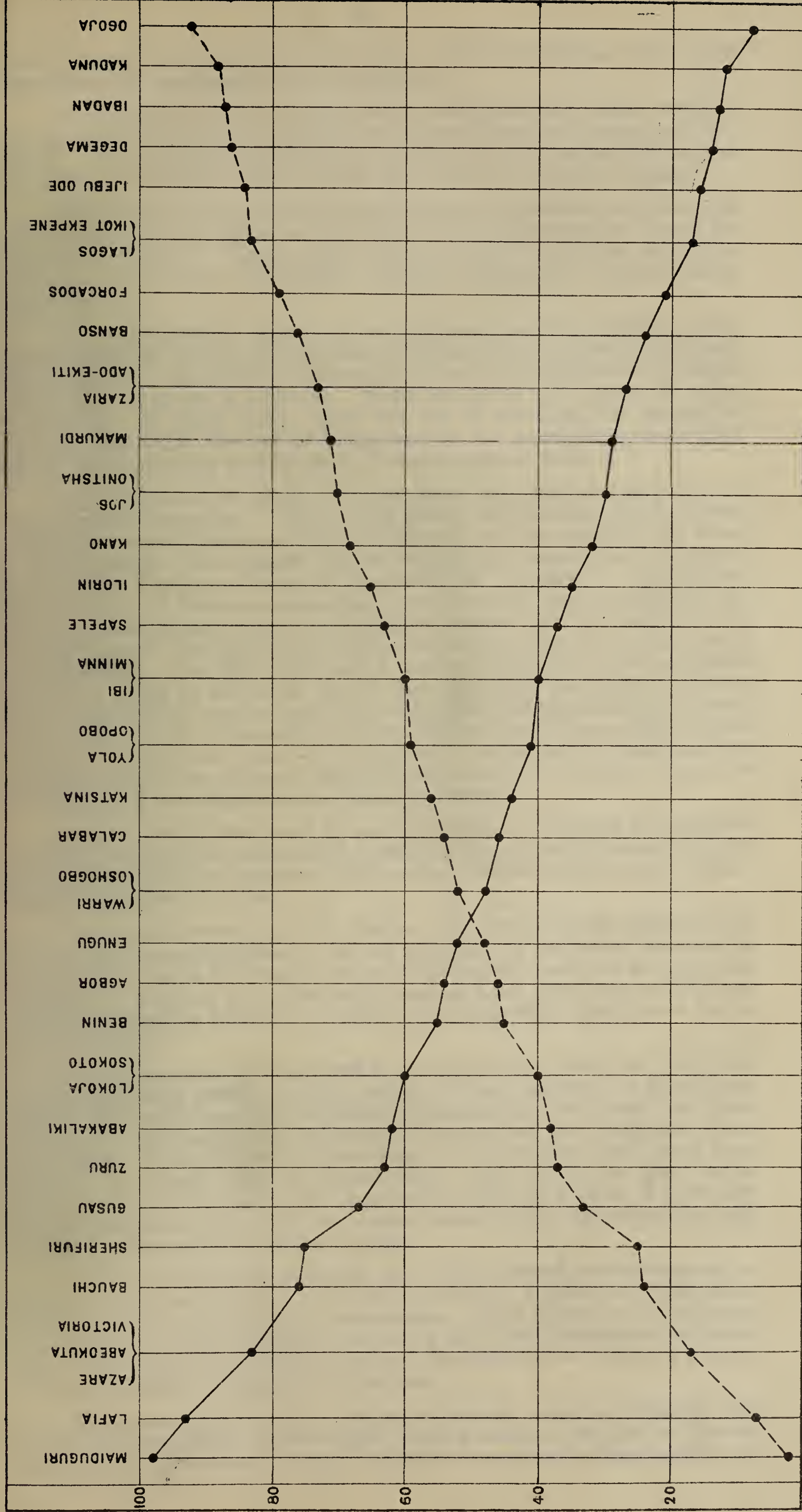


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————— RELATIVE % SYPHILIS TO YAWS
 - - - - - " " YAWS TO SYPHILIS

COMPARATIVE INCIDENCE OF SYPHILIS AND GONORRHOEA



— RELATIVE % SYPHILIS TO GONORRHOEA
 - - - " " GONORRHOEA TO SYPHILIS

equally to syphilis, gonorrhœa and yaws. Facts of interest which have arisen from the questionnaire are as follows :—

(1) *Treatment of acute gonorrhœa.*—Reports have been received from five Medical Officers upon the use of intra-venous injections of acriflavine. The reports are favourable but we have as yet no information concerning the possible effect of this drug upon the internal organs.

(2) *Treatment of chronic gonorrhœa and rheumatism.*—The difficulty of dealing with these cases is shown by the protean nature of the treatments adopted. These range from recognised sedative measures, vaccines, intra-venous acriflavine, colossal manganese, protein shock, diathermy, etc.

(3) *Treatment of syphilis.*—In forty-one medical stations, treatment adopted is by N.A.B. injections with or without mercury and pot. iod. by mouth. In thirteen stations intra-muscular injections of bismuth or mercury are given in addition. Notes are given concerning the value of “sobita” in some cases, upon the use of stovarsal for congenital syphilis, and upon the use of tryparsamide for paraplegic cases after N.A.B. injection and withdrawal of cerebro-spinal fluid.

(4) *Treatment of yaws.*—In the great majority of cases N.A.B. injections only are given. The courses given vary considerably but from 1-3 injections only are considered sufficient for the majority of cases by most officers. Six officers report satisfactory results with bismuth preparations (bivatol or bismuth arsanilate) or “sobita”. A considerable quantity of bismuth arsanilate was obtained and distributed for trial, but most reports upon it state that although clinical results are on the whole good local pain and infiltration at the sites of injection limit its usefulness. One officer reported a trial with halarsol, the conclusion arrived at being to the effect that it was generally successful but that some cases did not improve and the results were not generally so successful as with N.A.B. Considering that 42,000 cases of yaws came under treatment during the year it is obviously necessary to continue the attempt to find a satisfactory bismuth preparation to replace expensive arsenicals and investigations are being continued.

(5) *Control of treatment by serological tests.*—In only five stations could this be done as routine, but in many others it is the custom to send serum from at least a proportion of the cases treated to the nearest Pathological Laboratory by post.

(6) *Establishment of V.D. Clinics.*—In seven stations regular male V.D. clinics are established. In the majority of the other stations no special clinics exist but regular days and times are reserved for injection treatment. Regular V.D. clinics for women have only been established at three stations in addition to those at the maternity hospitals at Lagos and Abeokuta.

(7) *Training of African staff to give injection treatment.*—Medical Officers generally prefer, for the safety of their patients, to give intra-venous and intra-muscular injections themselves, but with the great increase of work which is developing it is obvious that assistants must be trained. In seventeen stations none of the African staff have been trained. In seven stations nurses have been taught to give intra-muscular injections only. In twenty-five stations a total of forty-one African members of the staff have been trained to give injections by both intra-muscular and intra-venous routes.

(8) *Use of bismuth, mercury, etc., as compared with arsenicals.*—Reference has been made to this in (4) above. Figures for 1928 show 36,522 injections of arsenical preparations, 2,870 injections of bismuth preparations, 1,616 injections of mercury and 116 injections of sulpharsonal. The figures for 1929 are not yet available but will show a greatly increased number of arsenical injections.

The importance of the campaign against venereal diseases and yaws is fully realised. Every effort is being made to popularise the use of bismuth preparations to replace expensive arsenicals where possible in

order that there need never be a shortage of effective drugs available for use in any station. Special V.D. treatment cards are being printed and issued in order that better statistical records may be obtained.

Leprosy.—The report of the Secretary of the Nigerian Branch of the British Empire Leprosy Relief Association appears in Appendix No. H.

Tuberculosis, Plague and Smallpox are dealt with in Section III.

(c) *Helminthic Diseases*.

(a) *Ankylostomiasis*.—This infection is common all over Nigeria and is associated with the defective system of nightsoil disposal common in African villages. Typical ankylostome anaemia is not commonly seen. The recently instituted system of examination of school children in Lagos has revealed the interesting fact that in spite of the presence of ankylostomes (and still more of ascaris) the haemoglobin percentage remains high.

(b) *Taeniasis* is exceedingly common in the Northern Provinces. 658 cases came under treatment in Kano alone. Altogether 6,109 cases were treated in Africans and 8 cases in Europeans.

(c) *Ascaris* infection is less common in the Northern Provinces but is exceedingly common in the Southern Provinces. Altogether 11,161 cases in Africans and fourteen cases in Europeans were treated during the year.

(d) *Guinea-worm* causes an immense loss of ability especially in the smaller towns and villages. The figures given for cases under treatment during the year—3,216—give but a poor idea of the economic loss of labour which results from this crippling complaint. It is more common in the Northern Provinces where 2,114 cases were treated as compared with 1,102 cases in the Southern Provinces.

(e) *Schistosomiasis*—It has long been known that this disease is widespread in Nigeria but more detailed information has been obtained during the year under review which points to a very general distribution and high infection rate. At the end of 1928 and early in 1929, three cases occurred in European in Sokoto Province. These cases were traced to the irrigation work at Kworre, near Sokoto, where Europeans had been making use of a bathing pool which was proved to contain infected snails. All officers in this area have been warned as to the necessary precautions to be taken and a general circular was issued to all European officials concerning this disease.

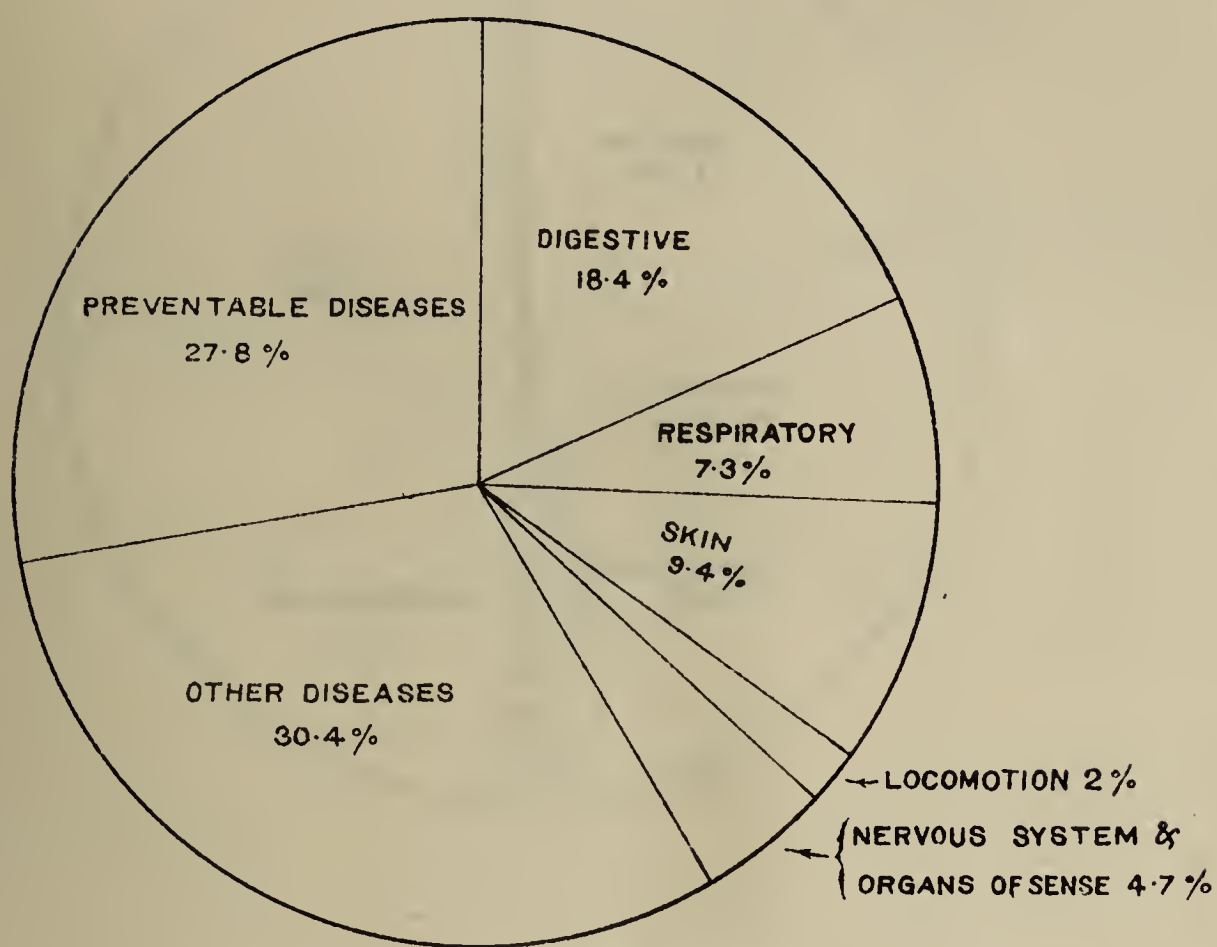
In Africans the disease is regarded as trivial when occurring in children. Recent investigations have shown a high infection rate in Katsina and Zaria Emirates and in Ibadan in Oyo Province. Thus routine examination of rural schools about Katsina showed an infection rate of urinary schistosomiasis of from 65-95%. Schools were brought in *en bloc* to Katsina where they continued their schooling while undergoing treatment. At Zaria a recent tour of Travelling Medical Officer has shown a juvenile infection rate at towns situated in the marshy country lying to the south and east of Zaria. At one town 75% of the schoolboys examined showed infection, at another 50%. In Ibadan routine examination of school children revealed a generally high rate of infection, 73% being recorded at one school. The number of cases receiving treatment during the year (444 Africans and three Europeans) gives but a slender idea of the widespread distribution of this helminthic infection.

B.—VITAL STATISTICS.

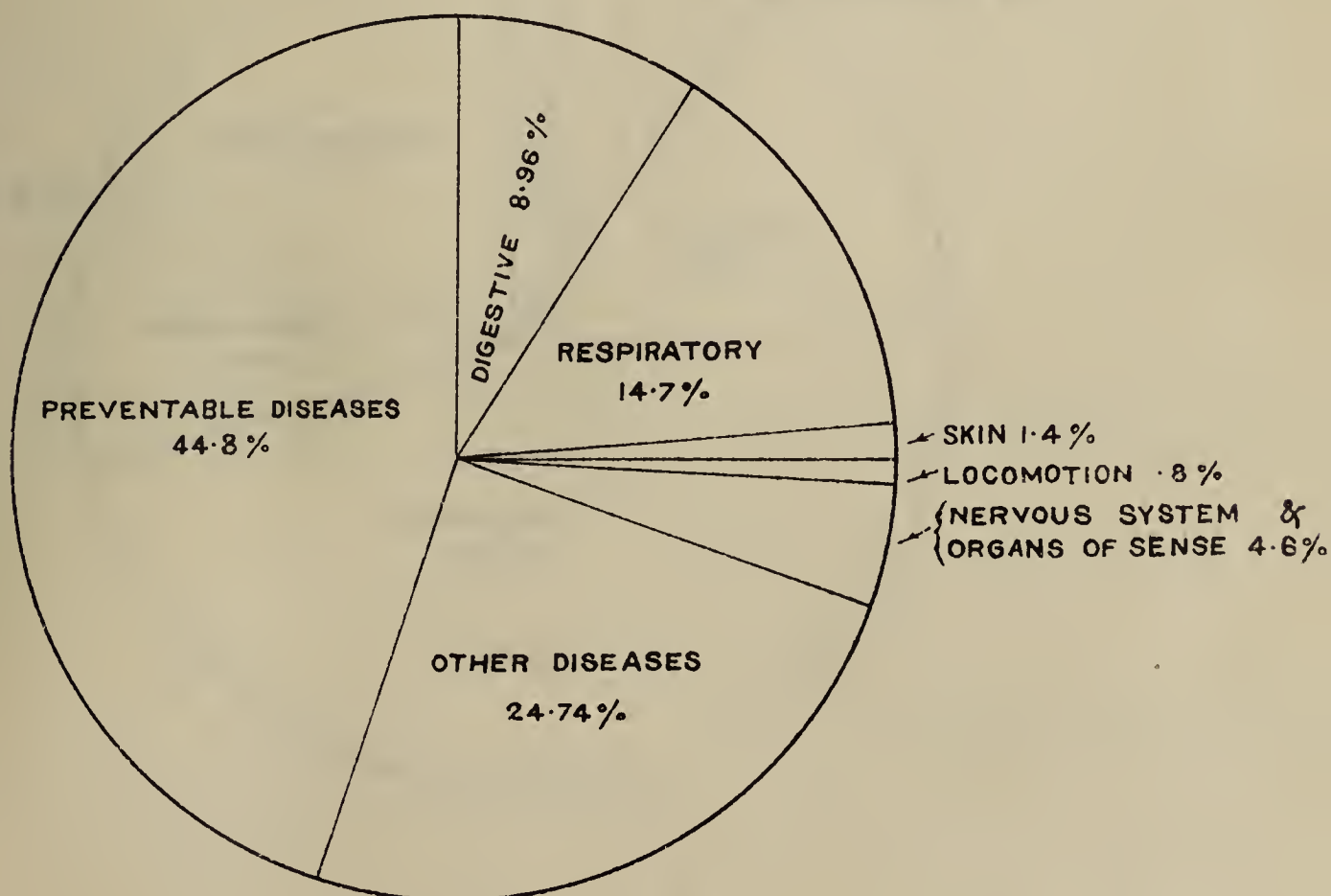
(1) *General African Population*.

The estimated population for Nigeria, including the mandated territory of the Cameroons is 19,308,688.

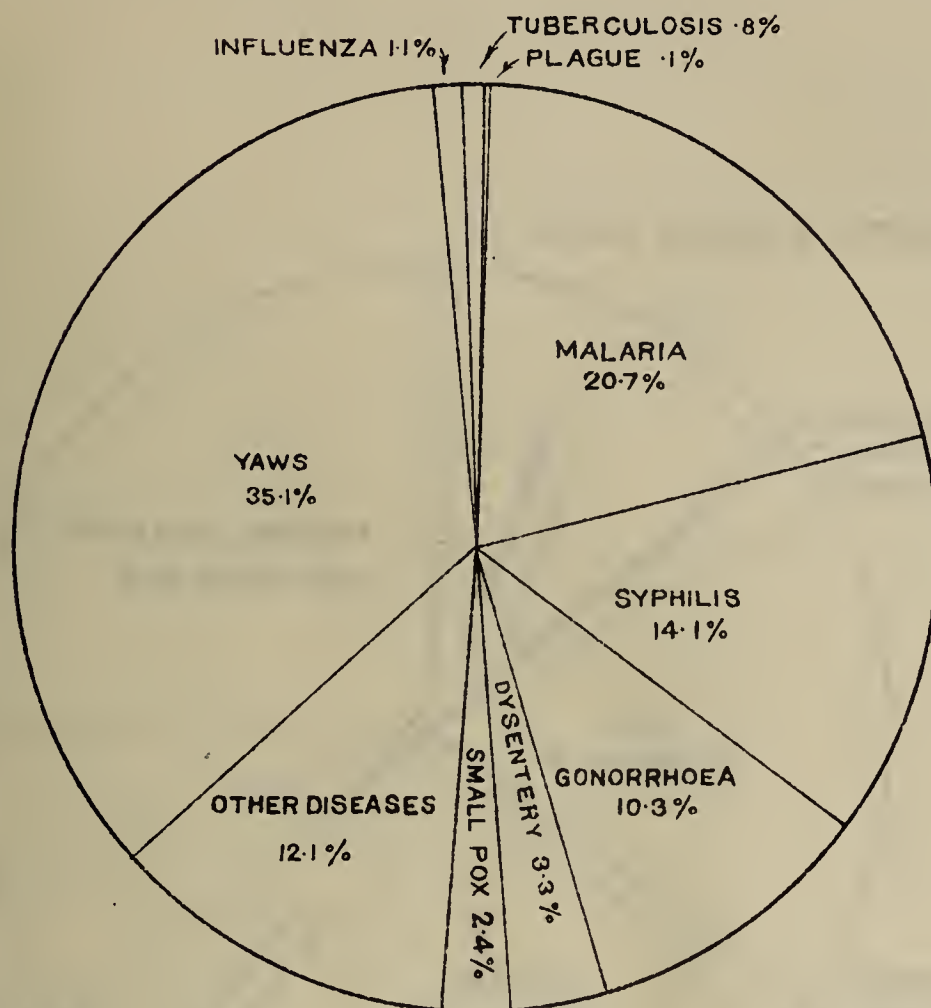
**GENERAL SYSTEMIC AND PREVENTABLE
DISEASES
TREATED IN GOVERNMENT INSTITUTIONS
TOTAL CASES - 432727
1929**



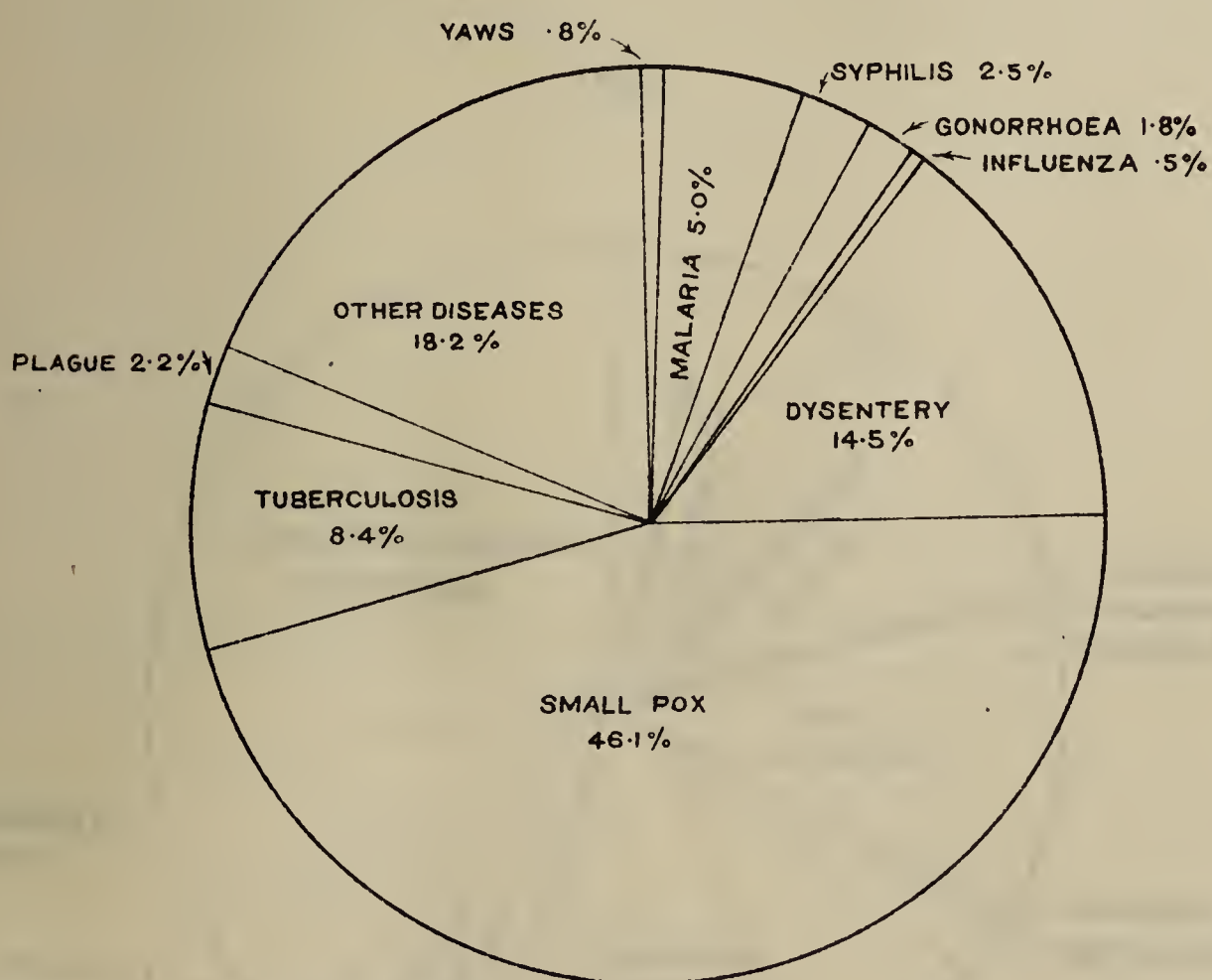
TOTAL DEATHS 2440



INFECTIVE DISEASES
TREATED IN GOVERNMENT INSTITUTIONS
TOTAL CASES 120098
1929

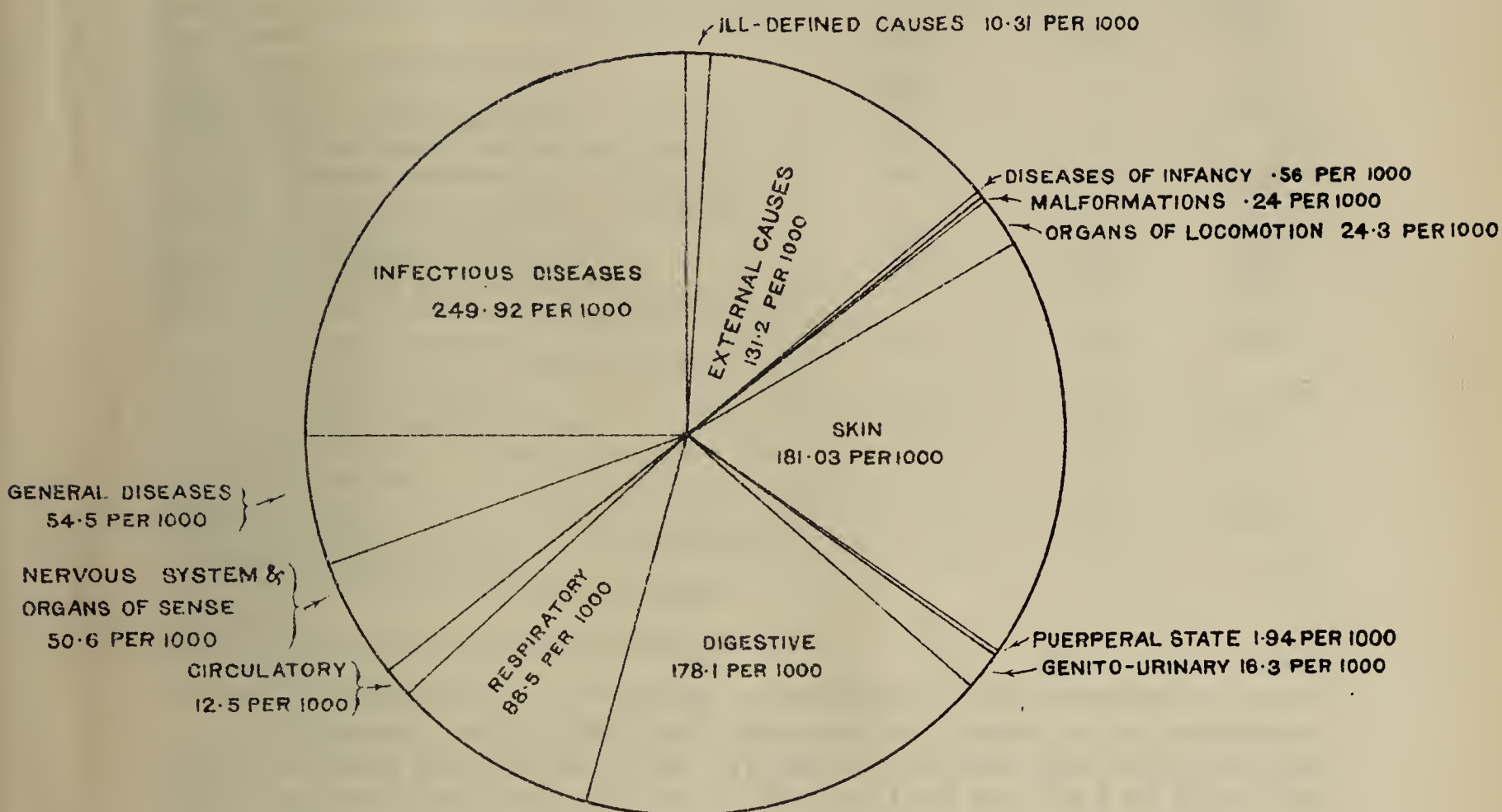


TOTAL DEATHS 1094

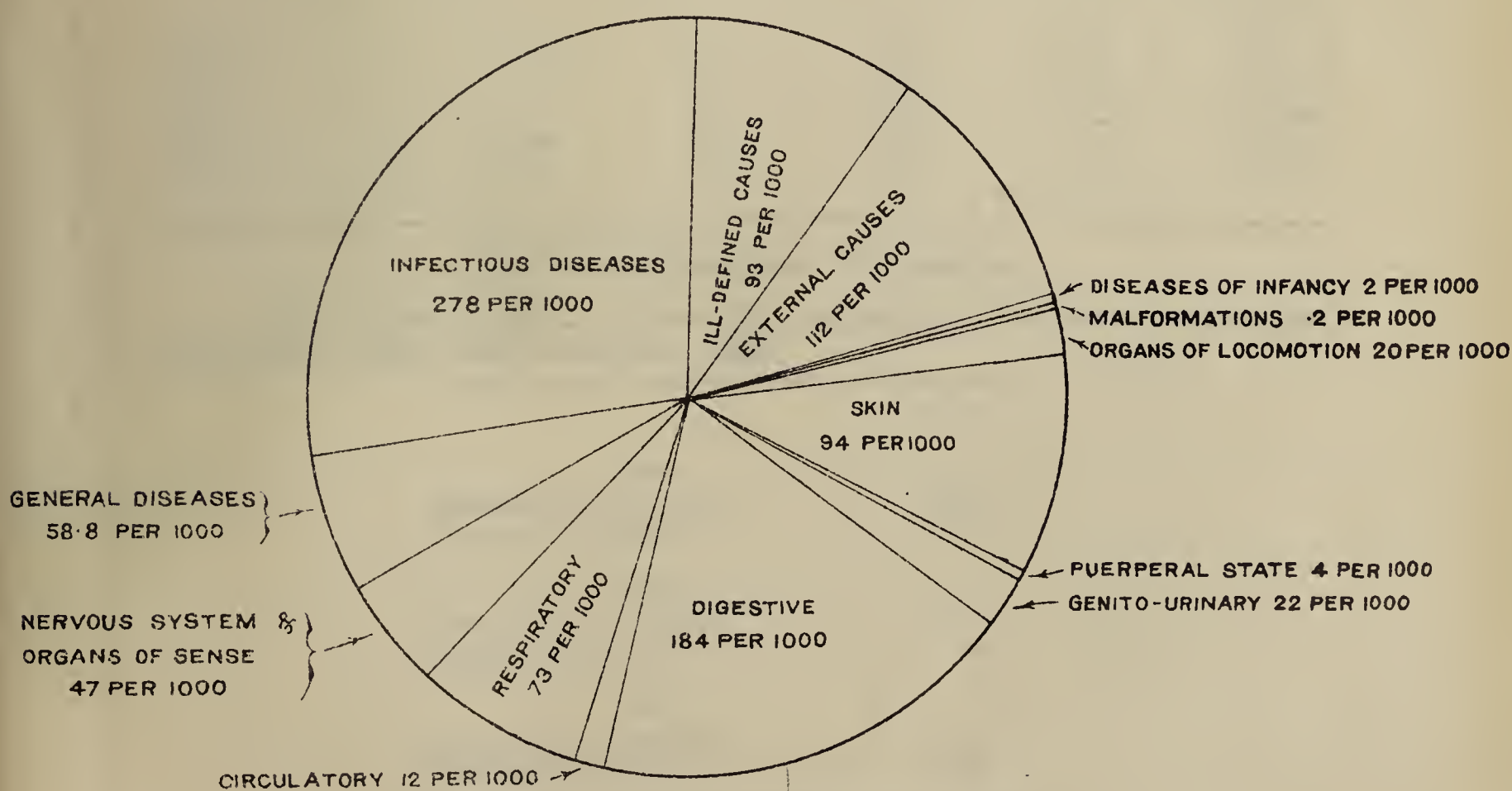


THREATS TO GOVERNMENT INSTITUTIONS

COMPARATIVE DIAGRAMS OF DISEASE GROUPS TREATED IN GOVERNMENT INSTITUTIONS 1928 & 1929



1928



1929

At present registration is only compulsory at Lagos and Ebute Metta. The vital statistics for this area are summarised in the following table:—

SUMMARY OF VITAL STATISTICS FOR LAGOS AND EBUTE METTA
FOR THE YEAR 1929.

	1929.		
	Lagos.	Ebute Metta.	Total.
Estimated Population (Lagos and Ebute Metta)	—	—	122,000
Total Births	2,788	663	3,451
Birth Rate per 1,000 population	—	—	28·2
Total Deaths	1,698	443	2,141
Death Rate per 1,000 population	—	—	17·5
Deaths—Causation of—Certified by Medical Practitioners—number	1,690	443	2,133
Deaths—Causation of—Certified by Medical Practitioners—per cent.	99%	100%	99%
Deaths—Infants under one year	345	118	463
Infantile Mortality per 1,000 births	123·7	177·7	134·1
Deaths under one year Certified by Medical Practitioners—number	338	118	456
Deaths under one year Certified by Medical Practitioners—per cent.	19·9	26·6	21·2
Deaths—Children under five years	512	177	689
Percentage of deaths of Children under five years to total deaths	30·1	39·9	32·1
Total Stillbirths	70	35	105
Stillbirths—proportion per cent. of the total Births (normal and stillbirths)	2·4	5·1	2·9
Deaths uncertified by Medical Practitioners—number	8	—	8
Deaths uncertified by Medical Practitioners—per cent.	·4	—	·37

Compared with 1928 it will be seen that there is an increase of estimated total population (from 118,500 to 122,000), the birth rate per 1,000 remains practically the same (28·1 in 1928 and 28·2 in 1929), the death rate per 1,000 has fallen from 20·5 to 17·5 and the infantile mortality rate has fallen from 138·1 per 1,000 to 134·1 per 1,000. The following summary enables comparison to be made with the figures for previous years:—

VITAL STATISTICS.

Year.	Total Births.	Birth Rate.	Total Deaths.	Death Rate.	Infant Mortality.
1909	2,576	42·4	2,259	37·2	315
1919	2,517	30·2	2,256	27·0	296
1927	3,305	28·9	2,312	20·2	174·9
1928	3,330	28·1	2,439	20·5	138·1
1929	3,451	28·2	2,141	17·5	134·1

(2) General European Population.

The following table shows the estimated European population during the years 1927, 1928 and 1929.

			Totals.
1927.			
Remaining on 31/12/27 .. ..	...	...	5,493
Deaths during 1927 ... ..	...	...	40
1928.			
Remaining on 31/12/28 ... ..	...	...	5,699
Deaths during 1928 ... ..	...	...	38
1929.			
Remaining on 31/12/29 ... ..	...	...	7,056
Deaths during 1929 ... ..	...	...	33

Although the estimated European population has steadily increased from 4,050 in 1925 to 7,056 in 1929, the number of deaths which have occurred in Nigeria have fallen. Forty-eight (1925); forty-two (1926); forty (1927); thirty-eight (1928); thirty-three (1929).

EUROPEAN—NON-OFFICIALS.

CAUSES OF INVALIDINGS AND DEATHS.

The number of invaliding of European non-officials in the Government Returns for the year 1929 is sixty-nine as compared with seventy-two in 1928, viz. :—

Anaemia, 2; asthenia, 3; blackwater fever, 6; malaria, 11; metrorrhagia, 1; pancreatitis, 1; pulmonary tuberculosis, 2; ulcer duodenum, 2; valvular disease of the heart, 1; mental alienation, 1; neurasthenia, 6; empyema, 1; dysentery, 2; appendicitis, 3; bronchitis, 1; cancer of breast, 1; pregnancy, 1; fracture of skull, 1; poliomyelitis, 2; cystitis, 1; colelithiasis, 1; optic neuritis, 2; pleurisy, 1; laryngitis, 1; pneumonia, 2; influenza, 1; nephritis, 1; insomnia, 1; tachycardia, 1; diabetes, 1; arthritis, 1; myocarditis, 1; cholecystitis, 1; myalgia, 1; hepatitis, 1; otitis externa, 1; burns, 1; intestinal stasis, 1.

The number of deaths among European non-officials is eighteen. The causes of deaths are :—

Malaria fever, 5; blackwater fever, 1; cerebral malaria, 1; myocarditis, 1; tubercular meningitis, 1; pneumonia, 2; drowning 1; cardiac failure, 1; dysentery, 1; endocarditis, 1; abortion, 1; paratyphoid fever, 1; meningitis, 1.

(3) European Officials.

TABLE SHOWING SICK, INVALIDING AND DEATH RATES OF EUROPEAN OFFICIALS FOR 1927, 1928 AND 1929.

	1927.	1928.	1929.
Total number resident	3,049	2,853	2,914
Average number resident	1,752	1,990	2,581
Total number on sick list	1,509	1,744	1,550
Total number of days on sick list	14,884	18,241	12,430
Average daily sick	40·78	49·9	34·05
Percentage of daily sick to average number resident ...	2·33	2·4	1·3
Average number of days on sick list to each patient ...	9·86	10·4	8·02
Average sick time to each resident	8·50	6·6	4·2
Total number invalided	150	200	207
Percentage of invalided to number resident	4·92	7·01	7·1
Percentage of invalided to average number resident ...	8·56	10·05	8·02
Total deaths	14	14	15
Percentage of deaths to number resident... ..	·46	·49	·51
Percentage of deaths to average resident	·80	·70	·58

EUROPEAN OFFICIALS —INVALIDINGS AND DEATHS.

Disease.	Invalidings.	Deaths.
Enteric Fever	1	—
Paratyphoid, B.	1	—
Malaria	14	—
Blackwater Fever	—	5
Influenza	2	—
Dysentery Bacillary	1	—
Dysentery Amoebic	4	—
Tuberculosis	5	—
Syphilis	1	—
Septicaemia	1	—
Rheumatism	2	—
Anæmia	30	—
Alcoholism	1	1
Carried forward	63	6

EUROPEAN OFFICIALS—INVALIDING AND DEATH—*continued.*

Disease.					Invalidings.	Deaths.
Brought forward	...	...	...	...	63	6
Melancholia	...	...	...	...	1	—
Mental Alienation	...	...	...	...	4	—
Psychasthenia	...	...	...	...	1	—
Epilepsy	...	...	...	...	1	—
Neuritis	...	...	...	...	3	—
Sciatica	...	...	...	...	1	—
Neurasthenia	...	...	...	...	31	—
Iritis	...	...	...	...	1	—
Other Affections Eye	...	...	...	...	2	—
Myocardial Degeneration	...	...	...	...	1	—
Valvular Disease Heart...	...	...	...	...	1	1
Arterio Sclerosis	...	...	...	...	2	—
Phlebitis	...	...	...	...	1	—
Bronchitis	...	...	...	...	3	—
Chronic Bronchitis	...	...	...	...	1	—
Asthma	...	...	...	...	1	—
Pyorrhoea	...	...	...	...	1	—
Gastric Ulcer	...	...	...	...	1	—
Duodenal Ulcer	...	...	...	...	1	—
Gastritis	...	...	...	...	5	1
Uveitis	...	...	...	...	1	—
Dyspepsia	...	...	...	...	2	—
Salivary Calculus	...	...	...	...	1	—
Intestinal Stasis	...	...	...	...	1	—
Diarrhoea	...	...	...	...	3	—
Gastro-Enteritis	...	...	...	...	1	—
Enteritis	...	...	...	...	1	—
Anorexia	...	...	...	...	1	—
Appendicitis	...	...	...	...	7	1
Liver Abscess	...	...	...	...	1	—
Congestion Liver	...	...	...	...	1	—
Hepatitis	...	...	...	...	1	—
Cholecystitis	...	...	...	...	1	—
Jaundice	...	...	...	...	1	—
Peritonitis	...	...	...	...	—	1
Chronic Nephritis	...	...	...	...	1	—
Renal Colic	...	...	...	...	1	—
Schistosomiasis	...	...	...	...	1	—
Pyelitis	...	...	...	...	2	—
Cystitis	...	...	...	...	1	—
Boil	...	...	...	...	7	—
Osteitis	...	...	...	...	1	—
Urticaria	...	...	...	...	1	—
Synovitis	...	...	...	...	1	—
Chronic Osteomyelitis	...	...	...	...	1	—
Burns	...	...	...	...	—	1
Heatstroke	...	...	...	...	1	—
Sunstroke	...	...	...	...	1	—
Lightning Stroke	...	...	...	...	—	1
Wounds (Firearms)	...	...	...	...	—	1
Dog bite	...	...	...	...	6	—
Fractured Femur	...	...	...	...	1	1
Debility	...	...	...	...	18	—
Insomnia	...	...	...	...	8	—
Asthenia	...	...	...	...	6	1
Total	...	...	...	...	207	15

RECAPITULATION BY COMPLETED MONTHS OF SERVICE.

Leave conditions.		Under 6 months.	Under 9 months.	Under 12 months.	Under 15 months.	Under 18 months.	Over 18 months.	Total.
New	...	16	13	21	64	76	2	192
Old	...	4	6	5	—	—	—	15
Total	...	20	19	26	64	76	2	207

Strength of Officers under New Leave Conditions 2,599
 " " " " Old " " 315

(4) *African Officials.*

The general health of the African officials during the year has been fairly satisfactory and this year again compares favourably with the last in the percentage number invalided or died :—

TABLE SHOWING SICK, INVALIDING AND DEATH RATES OF
AFRICAN OFFICIALS.

	1927.	1928.	1929.
Total number resident	3,425	3,590	3,796
Average number resident	3,418	3,582	3,682
Total number on sick list	3,006	2,757	4,953
Total number of days on sick list	18,033	20,651	25,841
Average daily sick	49·4	56·5	70·7
Percentage of daily sick to average number resident	·23	1·5	1·9
Average number of days on sick list to each patient	5	7	5
Average sick time to each resident	5	5	6
Total number invalided... ..	63	58	64
Percentage of invalided to number resident	1·8	1·6	1·6
Percentage of invalided to average number resident	1·8	1·6	1·7
Total deaths	40	28	24
Percentage of deaths to number resident	1·1	·77	·63
Percentage of deaths to average number resident	1·1	·77	·65

SUMMARY OF THE CAUSES OF INVALIDINGS AND DEATHS
OF AFRICAN OFFICIALS, 1929.

Disease.	Invalidings.	Deaths.
Anæmia	1	1
Aneurism (Aortic)	—	1
Appendicitis	—	1
Arterio-Sclerosis... ..	4	—
Blindness	2	—
Cardiac Diseases... ..	3	—
Cerebral Syphilis	1	—
Chronic Bronchitis	1	—
Chronic Nephritis	1	—
Chronic Osteo—Periostitis of the Right Tibia	1	—
Chronic valvular disease	1	1
Chronic Rheumatism	1	—
Cirrhosis of the Liver	—	1
Congestion of the Lungs	—	1
Deafness	1	—
Defective vision	8	—
Delusions of Persecution	1	—
Dementia	1	—
Diabetes mellitus	—	1
Enteric Fever	—	1
Fibrosis of the Lungs	1	—
General Debility	9	—
Hæmorrhage from Oesophageal Ulcer	—	1
Hemiplegia	1	—
Hernia (Strangulated)	—	1
Lateral Sclerosis of the Spinal Cord	1	—
Lymphadenoma	—	1
Intestinal obstruction	—	1
Malaria	—	1
Meningo-vascular syphilis	1	—
Mental Instability	3	—
Myocardial degeneration	2	1
Multiple Arthritis	1	—
Myelitis	1	—
Carried forward	47	14

SUMMARY OF THE CAUSES OF INVALIDINGS AND DEATHS
OF AFRICAN OFFICIALS, 1929.—*continued*.

Disease.					Invalidings.	Deaths.
Brought forward					47	14
Neurasthenia	...	...	...	...	3	—
Nephritis	...	...	...	...	—	1
Optic Neuritis	...	...	...	...	2	—
Organic diseases of the Spinal Cord	...	...	...	...	1	—
Paraplegia	...	...	...	...	1	—
Pneumonia	...	...	...	...	—	2
Pneumonic Plague	...	...	...	...	—	2
Pulmonary Tuberculosis	...	...	...	...	8	—
Pyelitis	...	...	...	...	—	1
Rheumatism and valvular disease of the heart	...	...	...	...	1	1
Septicæmia	...	...	...	...	—	1
Smallpox	...	...	...	...	—	1
Tabes Dorsalis	...	...	...	...	1	—
Tetanus	...	...	...	...	—	1
Total					64	24

(5) *Soldiers—Nigeria Regiment, R.W.A.F.F.*

The following figures show the health of the rank and file of the Royal West African Frontier Force and the Police for 1929.

Soldiers—Nigeria.

Average daily strength	...	...	...	...	3,071
Total number on sick list	...	...	...	...	4,176
Total number of days on sick list	...	...	...	...	25,654
Average daily sick	...	...	...	...	11.44
Total number of deaths	...	...	...	...	21
Death rate per thousand	...	...	...	...	6.8
The number invalided during the year was thirty-eight.					

During the previous year (1928) the death rate per 1,000 was 8.5.

(6) <i>Police Force.</i>		<i>Northern.</i>	<i>Southern.</i>
Average daily strength	...	1,208	2,498
Total number on sick list	...	463	1,905
Total number of days on sick list	...	4,878	7,632
Average daily sick	...	1.2	5.2
Total number of deaths	...	15	25
Death rate per thousand	...	12.4	10.09

The number invalided in the Northern Provinces during the year was thirty.

The number invalided in the Southern Provinces during the year was fifteen.

During 1928 the death rate per 1,000 was 17.6 in the Southern Provinces and 9.2 in the Northern Provinces.

III.—HYGIENE AND SANITATION.

A.—GENERAL REVIEW OF WORK DONE AND PROGRESS MADE.

I.—PREVENTIVE MEASURES.

(1) *Mosquito and Insect-borne Diseases.*

(a) *Malaria.*—General anti-malarial measures have been carried out during the year.

In Lagos regular house to house inspections for mosquito breeding are carried out, and a squad of collectors carry out a weekly collection of adult mosquitoes in certain definite zones. The mosquitoes are dissected and careful record is made of the percentage of room infestation and sporozoite rate. Of the 1,684 anophelines dissected, 8.73% were found to be infective. The dissections were carried out by Dr. A. Barber of the Rockefeller Yellow Fever Commission whose assistance in mosquito investigation in Lagos has been of the greatest value.

The identification of larvæ collected was carried out by Mrs. Connal, the Entomologist, Yaba. Experiments have been carried out to test the value of sub-soil drainage, and oiling by means of sub-soil drains charged with oil. The European Sanitary Inspector, Mr. J. Y. Browne engaged in the anti-mosquito work devised a machine for making cement sections for open jointed sub-soil drains. This machine or device can be operated by unskilled labour and enables the drain sections to be made at a low cost.

Larvicides—Paris green and fuel oil—have been used on all accessible water surfaces on Lagos Island and on the swamps in other parts of the township. To save costly reclamation, certain swamps have been surveyed, and herring bone and contour ditches made, thus removing large collections of water with a minimum of reclamation.

Obalende swamp has now been connected up with Five Cowrie Creek with consequent considerable reduction in the area of the swamp.

Ditching and draining has been extended to the other low-lying areas in Ikoyi and the swamps at Onikan, Okepa and south-east Ikoyi have been considerably improved. A start has been made to deal in a similar way with the large swamp at the north-east end of Ikoyi. This swamps breeds large numbers of malaria carriers:—*anopheles gambiæ* and *anopheles obscurus*.

At Apapa reclamation is being undertaken by the Marine Department and sand dredged from the bottom of the lagoon is being pumped into the swamp area.

(b) *Yellow Fever*.—No case of yellow fever was reported during the year. In the southern part of Lagos Island and on the lagoon, where most of the cases in the 1925-26 outbreak occurred, the special anti-mosquito measures continue to be energetically carried out. All small craft in the harbour are subject to regular inspection and owners required to take all steps necessary to remove or prevent accumulation of water in their craft. Periodically all small decked craft such as barges, launches, etc., are fumigated with sulphur by the clayton disinfector barge *Galen* for the destruction of adult mosquitoes.

At Ife in Oyo Province where it is suspected an endemic focus of the disease exists, investigations have been carried out by members of the Yellow Fever Commission of the Rockefeller Foundation.

During the year yellow fever was reported at various times from the following places outside Nigeria:—Monrovia in Liberia, Tumba in Belgian-Congo; Bahia, Para, Rio, Brazil in South America.

(2) *Epidemic Diseases.*

(a) *Plague*.—The special plague organisation which was set up in 1926 as a result of the recommendations made by Sir Edward Thornton in his report on plague in Nigeria, ceased to exist in November, when all the anti-plague operations in Lagos were taken over by the Medical Officer of Health. The special plague staff of two R.A.M.C. Majors and twenty-two Rodent Inspectors proceeded on leave at various times during the year and will not return.

An additional Medical Officer of Health was attached to the office of the Medical Officer of Health, Lagos, for plague duty, and provision was made in the 1929-30 estimates for a progressive increase of the staff of European Sanitary Inspectors from twenty-four to thirty-three to take the place of the Rodent Inspectors as they proceeded on leave.

The Medical Officer of Health, Lagos, reports that during the year 188 cases of plague were notified; of these 176 were fatal giving a case mortality of 93.6% for the year. 104 of the cases were bubonic, sixty-eight pneumonic and sixteen septicæmic.

Of the 176 deaths from plague 152 were dead when reported and were diagnosed post mortem.

The following table shows the number of plague cases, deaths and case mortality in Lagos during each year since plague first broke out.

Year.					No. of Cases.	No. of Deaths.	Case Mortality.
1924	...	...	...	...	411	349	84.3%
1925	...	...	...	...	104	88	84.6%
1926	...	...	...	...	497	476	95.8%
1927	...	...	...	...	155	151	97.4%
1928	...	...	...	...	519	509	98.0%
1929	...	...	...	...	188	176	93.6%

During 1929 the monthly occurrence of plague in Lagos, as in previous years, shows the heaviest incidence in October. For the first time since plague started one month—namely June—recorded nil cases plague. The rise in plague after June was rapid till the peak was reached in October with a similar rapid fall during November and December.

At Apapa which is inside the municipal area but separated from Lagos Island by the lagoon, a small outbreak of plague occurred during February, March and April. Four cases were reported. Rat plague was found among the rats in Apapa at the time.

Generally it can be said that the plague cases in Lagos were scattered more or less evenly about the most congested parts of the town.

Anti-rat measures were carried on during the year and a total of 220,382 rodents were caught. Of these 70,998 were black rats, 2,926 brown rats and the remainder shrews, bush rats and mice.

The black rat is the most important carrier of plague in Lagos, 98% of the rats found infected being black rats. Plague infection in mice was very rare and has not been found in shrews.

The infection index for all rats examined during the year was 0.54%. Comparing the mild plague year 1927 with the year under review though the number of plague cases reported (155) in the former year was less than the number reported in the latter (188) the infection index in rats in 1927 was almost double the rat infection index in 1929—for 1927 the index being 1.07% while for 1929 it was 0.54%.

The highest rat infection was found in the month of October as has been the experience every year since plague began.

The identification of fleas found on rats was carried out at the Medical Research Institute, Yaba and 74% were found to be *Xenopsylla cheopis* and 26% *Xenopsylla brasiliensis*.

The anti-plague work in Lagos is now organised under the Medical Officer of Health in such a way as to be carried out in very close conjunction with the routine district work of house to house inspections. A special anti-plague labour gang, each consisting of two self-contained units complete with headmen and equipment, has been allotted to each of the five districts in the township. A Senior African Sanitary Inspector under a European Inspector in each district closely supervises all the sanitary and anti-plague operations in his district. In this way intensive scavenging, deratting, disinfection and enforcement of all regulations and bye-laws affecting sanitation is ensured.

Action against owners of dangerous, dilapidated and otherwise insanitary buildings is carried out in close association with the Town Engineer.

The larger problem of the Town Planning of Lagos is in the hands of the Lagos Executive Development Board but arrangements have been made to ensure that proposals for new buildings, new streets, etc., arising in the course of ordinary town development fit in with any schemes for the improvement of Lagos which may be contemplated by the Board.

The gradual enforcement of rat proofing of stores and the supervision of the canoe traffic between Lagos and the mainland have been continued throughout the year. Traffic leaving Lagos by road is inspected at an inspection post near the municipal boundary at Yaba. Inspectors are posted at the railway stations at Iddo, Ebute Metta, Ebute Metta Junction and Yaba Halt for inspection of passengers leaving by rail.

On the mainland no human plague was reported during the year, the anti-plague measures there being continued in the form of a very strict supervision of the sanitary state of the principal towns and villages. Medical Officers of Health were posted to Ibadan and Abeokuta and the European Sanitary Inspector staff increased. In Ijebu Ode the Medical Officer is in charge with European Sanitary Inspectors under him. No plague infected rats were found on the mainland during the year.

(b) *Smallpox and Vaccination*.—Smallpox is always present somewhere in Nigeria.

During the year in the Northern Provinces 645 cases were reported to the Senior Sanitary Officer, Kaduna, from Plateau, Adamawa, Niger, Benue and Bornu Provinces. In the Southern Provinces an extensive outbreak occurred in Owerri Province from which the infection spread into Onitsha and other neighbouring provinces. This outbreak contrary to the usual expectation reached its maximum during the rainy season. The total cases of smallpox reported in Southern Provinces during the year was 2,571. During the year smallpox was reported at the following parts in Nigeria:—Lagos, 14 cases; Port Harcourt, 67 cases, Forcados, 3 cases; Burutu, 4 cases; Calabar, 2 cases; the majority being cases imported from outlying villages. Vaccination has been carried out energetically both in the Northern and Southern Provinces during the year.

A special vaccination campaign was carried out in January, February and March in the Plateau Province under a European Sanitary Inspector.

European staff of Medical Officers and Sanitary Inspectors organised intensive vaccination in Owerri and adjacent areas in Southern Provinces from the time the smallpox outbreak there was first reported. Lanolinated lymph prepared by the Lister Institute was used and was found to be very satisfactory.

VACCINATIONS.

SOUTHERN PROVINCES.

		1927.		1928.		1929.
Total vaccinated	...	296,988	...	309,588	...	518,197
Number inspected	...	235,172	...	276,664	...	415,555
Number successful	...	185,218	...	200,363	...	343,574
Percentage successful of those inspected	...	78.7%	...	65.0%	...	82.6%

NORTHERN PROVINCES.

		1927.		1928.		1929.
Total vaccinated	...	107,146	...	121,074	...	89,872
Number inspected	...	62,271	...	78,004	...	60,599
Number successful	...	49,058	...	63,495	...	50,280
Percentage successful of those inspected	...	78.7%	...	81.4%	...	83%

The total vaccinated in Northern Provinces does not include vaccinations done by Native Administration Vaccinators.

(c) *Cholera*.—This disease has not yet been reported in Nigeria.

(d) *Enteric*.—During the year ten cases with one death occurred in Europeans and fourteen cases with two deaths occurred in Africans. The type was proved to be *B. Typhosus* in seven, *Para. A* in five, *Para. B* in three, not defined, nine.

(e) *Tuberculosis*.—595 cases of pulmonary tuberculosis in Africans with eighty-one deaths were treated at hospitals and dispensaries during the year.

The disease is not notifiable and undoubtedly is more frequent than the above figures indicate.

In Lagos, 159 deaths were registered as due to tuberculosis of which 136 were pulmonary cases. Disinfection and lime washing of houses where deaths from tuberculosis have occurred is carried out as a routine measure in Lagos.

The following table gives the incidence of tuberculosis in Lagos during the past eight years :—

	1921.	1922.	1923.	1924.	1925.	1926.	1927.	1928.	1929.
Pulmonary	57	74	85	69	72	102	107	163	136
Other Forms	8	4	6	23	10	23	53	38	23
Total	65	78	91	92	82	125	160	201	159
Percentage Total of certified deaths ...	6.1	6.5	8.4	4.9	6.6	5.7	8.7	8.9	7.4

(f) *Cerebro-Spinal Fever*.—There was no important outbreak of this disease during the year.

One fatal case was admitted into the Infectious Diseases Hospital, Lagos.

II.—GENERAL MEASURES OF SANITATION.

Generally outside of townships the bush or cesspits constitute the ordinary village system of conservancy. In the majority of townships pail latrines are used. The pail contents are trenched daily. The sewage disposal system in Lagos remains as described in the 1927 Medical and Sanitary Annual Report. The disposal of sewage at the dejection jetty in the Ebute Metta district of Lagos will be supplanted when the new faecal incinerator has been erected on the site selected in the southern portion of the Yaba Estate.

Experiments have been carried out at Ikoyi as to the feasibility of introducing into residences on sites where the ground water level permits, flush latrines connected to septic tanks. So far as tried these experiments have given satisfactory results.

Scavenging and Refuse Disposal.—Combustible refuse is burned. Plans of a simple and cheap type of incinerator built of mud have been drawn up and circulated for the information of sanitary authorities. Incinerators of this type should be very useful for small towns and villages.

The Heenan and Froude destructor in Lagos has worked very satisfactorily. It was found that during the rains the cells provided were not sufficient to cope with rain sodden material and for a short period during the height of the rains quantities of refuse had to be dumped direct into reclamation areas.

Drainage.—In most villages there is little attempt at drainage. In the larger towns earth and cement drains are used. The cost of maintenance of earth drains is considerable.

The drainage problem as presented in that part of Lagos on Lagos Island is difficult. During the year existing drains have been extended and new drains built. In some of the low-lying areas reclamation will be a necessary preliminary to drainage.

Water Supplies.—Progress has been made and the Kaduna pipe-borne treated water supply is approaching completion. The water will be dosed with alum and sedimented prior to filtration and chlorination. Work is now in progress on the Kano Water Supply. This supply will be drawn from the Challowa River. Field work in respect of the proposed water supply for Jos has now been carried out and the plans and estimates are being drawn up.

In Sokoto experimental borings have been made by the Geological Survey and what appears to be a fairly constant supply of water has been tapped at a depth of 150 feet. A pumping plant is being brought out to test this supply. It will be 1931 before the tests can be completed.

A pipe-borne water supply has been provided for Moor Plantation and the Ibadan Upper Middle School. The water is treated with alum and sedimentation with subsequent rapid filtration and chlorination. The pipe-borne water supply for Onitsha has been completed.

Offensive Trades.—The hide and skin industry is practically entirely confined to the Northern Provinces and most trading firms combine general trade with the hide-curing industry. The nuisance associated with hide-curing, which is most difficult to control, is the smell nuisance. In the laying out of new townships, it has been arranged in order to fit in with the customary combined form of trading that the business area be divided into two sections in one of which the hide and skin industry is prohibited. This will enable traders not engaged in the hide trade, to obtain plots in a part of the business area free from hide-curing nuisance.

Clearing of Bush and Undergrowth.—At all Government stations funds are allocated according to the size of the station from sanitary votes for bush clearing. In the larger townships additional funds are provided from the township funds for this purpose.

In Lagos all funds for grass-cutting and bush clearing are provided from township funds.

The cutting of grass and bush is a continuous burden during the rainy part of the year from April to December.

Sanitary Inspections.—During the year the Deputy Director of Sanitary Service or Assistant Director of Sanitary Service visited and inspected the following places:—Epe, Ejirin, Ikorodu, Agege, Abeokuta, Ibadan, Oyo, Ogbomosho, Ilorin, Oshogbo, Ilesha, Ife, Akure, Ado-Ekiti, Ifon, Benin, Onitsha, Enugu, Asaba, Agbor, Ijebu Ode, Shagamu and Iperu.

In addition the Senior Sanitary Officer, Kaduna, visited the various provincial stations in Northern Provinces.

Routine inspection of Government stations is carried out by African Sanitary Inspectors. In addition European Sanitary Inspectors are posted to the larger stations and ports.

Sanitary supervision in the larger towns under Native Administrations is carried out by inspectors who are only partially trained. Some native administrations have appointed youths to be trained as Sanitary Inspectors at the Government training centres at Lagos and Kano. Training of inspectors for native administrations is also being undertaken by the Government Sanitary staff at Ijebu Ode.

III.—SCHOOL HYGIENE.

The sanitary supervision of school premises is part of the ordinary routine work of inspections in stations. During the year the Medical inspection of school children was begun at Ibadan, and preliminary arrangements have been completed to commence inspection in the Lagos schools in 1930.

The general scheme is that all children at Government or Government Assisted Schools in these places will be examined once every three years during their school career and the medical inspection card for recording the results of each examination has been drawn up and printed. These cards will be filed at each school. In addition arrangements have been made to enable children to obtain treatment when necessary, by giving notice to the parents that treatment is required. If this fails to procure the necessary treatment, a further notice will be sent offering, if the parents have no objection, to treat the child at the school dispensary clinic. At this clinic, treatment will be free.

At Ibadan fifty-four scholars were examined at the Wesley School and 282 (forty-five of whom were girls) at the Government Middle School.

An analysis of the conditions found is interesting. Total scholars examined 336.

- 180 or 53.5% enlarged spleens.
- 202 or 60.1% infected with schistosomum hæmatobium.
- 123—not vaccinated.
- 24—umbilical hernia.
- 21—lung diseases.
- 17—skin rashes, ringworms, etc.
- 14—defective teeth.
- 7—valvular disease of heart.
- 6—trachoma.
- 4—guinea-worm.
- 3—enlarged glands.
- 2—otorrhœa.
- madura foot.

All the unvaccinated scholars were vaccinated. Three blood slides were taken from each of fifty scholars selected at random and examined for malaria parasites by three observers including Dr. Barber and Dr. Kumm of the Yellow Fever Commission—all were found to harbour malaria parasites. The parasites were subtertian and quartan, in some cases double infections with both types of parasite were found.

IV.—LABOUR CONDITIONS.

There is no contract or indentured labour in Nigeria.

An Ordinance to provide for a new labour code for Nigeria was passed in February, 1929.

This Ordinance makes provision for the declaration of Labour Health Areas and special regulations have been made under section 62 setting out what Medical and Sanitary requirements must be maintained in areas so declared.

The power to declare Labour Health Areas applies to Southern Provinces and British Cameroons only, and does not apply to the Northern Provinces.

Thirty plantations in the Cameroons British Mandate were declared Labour Health Areas by notice published in *Gazette* No. 51 of 26th September, 1929.

The labourers on the plantations are engaged under the ordinary terms of employment and none are engaged under contract or indenture. The Plantation Companies provide housing accommodation for the labourers and issue food rations daily or weekly. The conditions under which the labourers serve are satisfactory. In the tin mining area in Plateau Province the fall in the price of tin has reduced employment.

These mines are in Northern Provinces and are excluded from the provisions applicable to Labour Health Areas. The labour employed on railway construction is being reduced as construction is approaching completion.

V.—HOUSING AND TOWN PLANNING.

The Lagos Executive Development Board which was set up under the Lagos Town Planning Ordinance commenced work in January, 1929.

A considerable amount of work has been done in laying out and developing the Yaba estate. A large market—the Obada Market has been erected in the estate, roads have been made, and the leasing of plots for building purposes has commenced.

In the Suru Lere area on the outskirts of the Lagos Municipal area considerable development has taken place. The Board has had the area surveyed and the roads have been planned in order to control building operations and to avoid a repetition of the gross conditions of congestion now existing on Lagos Island. On the Island of Lagos a large market site is being prepared near the Idumagbo Lagoon and detailed surveys and valuations are being carried out as a preliminary to dealing with the worst areas on the island. The Town Planner has visited many towns outside of Lagos where development is active. Much town planning work has been done at, among other places, Enugu, Port Harcourt and Oshogbo.

VI.—FOOD IN RELATION TO HEALTH AND DISEASE.

At stations to which sanitary staff are posted the inspection of food stuffs is carried out as a routine duty. Animals slaughtered for the food of man are inspected at the time of slaughter.

During the year there was no special outbreak of deficiency disease reported.

At Jos and Port Harcourt new markets have been erected and it is proposed to build a new market at Kano. In Lagos the site for the new Oyingbo Market at Ebute Metta has been reclaimed and construction of the market has commenced.

Abattoirs of improved design, built of concrete and fly-proofed have been erected at Zaria, Kano and Kaduna.

All bake-houses and eating-houses in Lagos are registered and regularly inspected.

Three aerated water factories were registered in Lagos. Samples were taken weekly during the year and sent to the Water Analyst for bacteriological examination. The samples from two of the factories showed during the year a very high standard of purity. The results given by the samples from the third factory were so persistently poor that this factory closed down towards the end of the year.

B.—MEASURES TAKEN TO SPREAD THE KNOWLEDGE OF HYGIENE AND SANITATION.

Elementary hygiene is taught in Government and assisted schools, as part of the school syllabus.

INFANT WELFARE AND MATERNITY.

This work is described under Section V.

C.—TRAINING OF SANITARY PERSONNEL.

The Sanitary Estimates 1929-30 provided for eighteen Sanitary Inspectors-in-Training. These men are trained at the principal training centre in Lagos. The period of training and the syllabus are as described in the Annual Medical and Sanitary Report for 1928.

During the year correspondence has been carried out with the Royal Sanitary Institute, London and all arrangements have been completed for holding examinations for Sanitary Inspectors, British West Africa. The first examination will be held at Lagos in July, 1930. The Nigeria Board of Examiners include the Director of Medical and Sanitary Service, the Deputy Director of Sanitary Service, the Town Engineer, Lagos, the Medical Officer of Health, Lagos, and the Pathologist, Lagos. An Honorary Secretary has been appointed with an office in the Government Public Health Department, Lagos.

In the Northern Provinces, Kano is a training centre and a certain number of learners are given tuition in the elements of sanitary work. A number of the learners are being trained for service with native administrations in the Northern Provinces.

D.—RECOMMENDATIONS FOR FUTURE WORK.

1. Extension of water supplies to other large towns such as Zaria, Ibadan, etc.
2. Development of sanitary control in the larger native administration towns.
3. Extension of Infant and Maternal Welfare and Medical Inspection of school children.

W. J. PIRIE,
Deputy Director of Sanitary Service.

Sanitary Office,
21st March, 1930.

IV.—PORT HEALTH WORK AND ADMINISTRATION.

The Port of Lagos is the principal Nigerian Port and is fully equipped to deal with disinfection and deratting of vessels. When the model certificates of deratisation and deratisation exemption, as prepared by the Office International d'Hygiene Publique and referred to in Article 28 of the International Sanitary Convention, 1926, have been received, the Lagos Port Sanitary Authority will be competent to issue such certificates when necessary.

A European Medical Officer of Health is the Port Sanitary Authority and is employed wholly on port health work. He has two European Sanitary Inspectors under him. In addition the following African Staff are employed:—three African Sanitary Inspectors, one Female Attendant, one Vaccinator, eight Rat-Catchers and twenty labourers.

During the year improvements in buildings and equipment at the Port Sanitary Authority's Office have been made. A small laboratory has been added and the fumigating chambers for passengers' baggage have been increased to four, giving a total fumigating space of 4,100 cubic feet. New water supply connections have been made and spray baths have been provided in the passengers' bathrooms. A vaccinator's room has been added and so arranged that passengers after cleansing and disinfestation are vaccinated before leaving the station. The disinfestation of passengers' clothing is done by steam and an "H" type electrically-driven Clayton machine has been installed for sulphur disinfection of baggage. Electric light has been put into the principal rooms in the building. The motor sulphur fumigating barge *Galen* has given satisfactory service but most of the fumigations on vessels have been carried out by cyanide in the form of Zyklon "B".

After considerable experimentation, it has been found that the most satisfactory gas mask for cyanide work is the "Purethra" mask. This mask resists climatic deterioration, is comfortable to wear and the eye-pieces do not fog.

During the year 959 sea-going vessels arrived and the same number cleared from Lagos; twenty-two of these vessels were fumigated. 33,069 passengers were inspected or passed through the port inspection and disinfestation are vaccinated before leaving the station. The disinfected and disinfested. In addition all small craft, lighters, launches and canoes in the harbour were subjected to regular routine inspection and disinfection.

Port Harcourt.—The Medical Officer of Health is the Port Sanitary Authority. One African Sanitary Inspector is engaged in inspecting the port area and in supervising the disinfecting station. The disinfecting station has been in use since July, 1929, and one Female Attendant and three labourers are employed at the station.

Shower baths are provided for passengers. For the disinfection of clothing and baggage, one steam sack disinfector and one petrol driven Clayton for sulphur dioxide fumigation are available. There is a closed chamber for Zyklon "B" cyanide disinfection. 4,300 passengers with baggage passed through the inspection and disinfecting station. About 500 vessels entered and a similar number cleared from the port during the year.

Calabar.—The Medical Officer who carries out the duties of Medical Officer of Health, Calabar, boards all vessels on arrival and inspects passengers. At all Nigerian ports, Bills of Health are issued to vessels on departure.

V.—MATERNITY AND CHILD WELFARE.

The Maternity Hospital and Out-Patient Clinic for women and children at Massey Street, Lagos, who continues to be very busy. It is in charge of a Lady Medical Officer who has the assistance of an European Nursing Sister and two trained African Midwives. Seven Pupil Mid-

wives are undergoing training and this duty forms an important part of the Lady Medical Officer's work. During the year 222 in-patients and 6,523 out-patients were treated. These figures include 505 women who attended for ante-natal examination, 108 women who were delivered in the Hospital by normal labour, and seventeen cases of abnormal labour. No deaths occurred in labour cases. During the year a children's ward was opened at this hospital.

Infant welfare work in Lagos is carried on under a Lady Medical Officer employed by Lagos Town Council. Under her are one Senior and eight Junior Health Visitors.

The principal clinic is at Massey Street Dispensary in Lagos Island and is open on three days a week. During the year a clinic open one day a week was started at the Ebute Metta Dispensary. The Lady Medical Officer in her report states that the attendance at these two clinics was most encouraging—the total attendances being 4,645. 180 cases were referred to hospitals for further treatment.

The diseases most prevalent among infants under one year of age were malaria, tetanus, convulsions, respiratory and digestive diseases and diseases of early infancy. Tetanus was responsible for eleven infant deaths. The Lady Medical Officer reports that 75% of the mothers are engaged in some form of trade and it is therefore naturally difficult to persuade them to leave their trade to attend illness when their infants appear quite well. Health visiting is mainly directed to helping these women in their homes.

These home visits are carried out by the Health Visitors and, if necessary, the Lady Medical Officer, and an effort is made to teach the women in their homes what is generally taught at the clinics.

At the Dispensary clinics apart from the inspection and treatment of infants the mothers are given simple advice in the care and management of children, the principles of hygiene and sanitation are explained and when possible demonstrations of native food stuffs suitable for children and the best methods of preparation are held. Three such demonstrations were given and nearly 200 women attended.

Ante-natal Work.—Eight cases attended the clinic during the year three of whom were confined at Massey Street Maternity Hospital, and five at their homes. The birth rate for Lagos and Ebute Metta for the year was 28.2 per 1,000 population and the infant mortality rate was 134.1 per 1,000 births.

The Infant Mortality, Lagos, and Ebute Metta during the years 1926 to 1929 are shown below :—

1926.	1927.	1928.	1929.
198	174.9	138.1	134.1

The Lady Medical Officer points out that deaths of infants under three weeks old constitute 40.6% of deaths under one year of age. In her opinion the high mortality in the first three weeks after birth is largely due to ante-natal conditions. Medically certified deaths of infants under three weeks show prematurity, congenital debility and marasmus as the commonest causes.

Training of Health Visitors.—This is carried out under the Lady Medical Officer at the Welfare Clinics and each is required in turn to spend one month at Massey Street Dispensary to learn the elements of surgical treatment. Progress has been satisfactory, the health visitors take a greater interest in individual infants and mothers and a sense of responsibility is manifesting itself.

On the theoretical side three hours a week are devoted to lectures but the advance has not been very marked.

The Lady Medical Officer attributes this to the very elementary general education of the Health Visitors and the comparatively short time that can be spared from their district and clinic duties to attend lectures.

An Infant Welfare and Maternity Clinic was started in Abeokuta in 1929 by the Egba Native Administration. A European Sister was engaged and has charge of the staff and clinic. Under Miss McCotter this clinic has been very successful and the average monthly attendances are about 4,000.

In connection with this clinic about 400 maternity cases have been attended since it started.

A Government Lady Medical Officer is in charge of the female wards at the Sacred Heart Hospital, Abeokuta, where maternity cases are admitted and where pupil midwives are trained.

The Church Missionary Society at Iyi Enu in Onitsha Province are anxious to extend the sphere of maternity work. A Government grant of £1,000 was given to enable a maternity and labour ward to be built and it is hoped that the training of midwives will become an important function of this medical mission.

Maternity and infant welfare work are also an important side of the work at the hospital of the Wesley Guild Mission at Ilesha and the Baptist Mission at Ogbomosho.

A commencement is being made with maternity and child welfare work in the Northern Provinces, where it is planned to open centres at Katsina and Kano in 1930. The Emirs of these two important places expressed their keen interest. At Katsina the large mud-built house previously occupied by the Medical Officer is being converted into an out-patient clinic with small ward accommodation. The building is close to the new Native Administration Hospital. It will be opened early in 1930 by a Lady Medical Officer who will work in close co-operation with a lady member of the Education Department. At Kano one section of the compound of the fine new Native Administration Hospital in Kano City has been fenced off to include one part of the out-patient department and one female ward. This will be ready for occupation early in 1930 and will be opened by an European Sister holding a C.M.B. qualification.

Considerable difficulty is likely to be experienced in the early stages, more particularly with the training of the Mohammedan illiterate women. It is hoped to give the Lady Medical Officer in charge an opportunity to visit the excellent midwifery school for illiterate Arab women, which is being run so successfully by Miss Wolff at Omdurman in the Sudan.

A Committee of the staff was formed to standardise the syllabus for training of African midwives for the Government Examination, and this has been circulated to training centres and medical missions. Legislation in the form of a Midwives Ordinance will be required and proposals on these lines will be submitted in 1930.

VI.—HOSPITALS, DISPENSARIES AND VENEREAL CLINICS.

The new European Hospital at Kano has been completed and will be opened early in 1930. The new African Hospitals at Oshogbo Ijebu ode, Kumba, Kafanchan and Lafia were opened during the year. The new African Hospital at Aba, completed last year, was opened in 1929. At Kaduna African Hospital the clerks' ward, maternity ward and Venereal Diseases Irrigation Room have been completed. Extensions are being made to the African Hospitals at Onitsha, Enugu and Jos and to the Native Administration Hospitals at Ibadan, Maiduguri and Katsina. Progress has been made with the new African Hospitals at Zaria, Abeokuta and Bida; the latter will be opened early in 1930.

The fine new African Hospital which is being built by the Native Administration in Kano City is progressing and the out-patient department was opened during the year.

Approval has been obtained to commence work upon a new African Hospital at Akure in Ondo Province in 1930 and the Native Administration will commence the building of a new African Hospital at Sokoto.

Progress has been made with the African Hospital at Lagos. Three two storey ward blocks, pathological laboratory and post-mortem room, and Resident Medical Officer's quarters are nearly completed and will be opened early in 1930. It was decided to complete this hospital temporarily with semi-permanent buildings and the out-patient block, kitchen and laundry block, administration block and two wards are being erected in this way. Existing temporary wards (2) are being retained and existing permanent buildings are being modified as X-ray block, out-patient theatre and African staff rooms. The existing European Sisters' quarters are being extended and a permanent operating theatre with lift is being put up. This modification of the original plan will enable the hospital to be completed at the end of the financial year 1930-31 and provides over 100 beds more than in the original plan. It will in no way interfere with completion of the hospital upon the original plan when this is desirable. It is unfortunate that this modification was necessary, but the new plan provides more beds, allows early completion which is most desirable, and shows a saving of £78,850, while it does not diminish the practical value of the hospital work.

A simple type of hospital building termed the "Country Type Hospital" was planned during the year. The buildings are upon the simplest lines and can be put up in cement, pisé, timber with asbestos panels, or in timber. Roofs are of corrugated iron with celotex lining; the buildings are constructed on cement plinths. Although not ideal the lower cost of such buildings allows much greater provision of beds and more rapid progress in construction. A ward block of thirty-six beds of this type is estimated to cost roughly £1,140 as against £7,344 for a ward block of thirty-two beds of the plan adopted for Nigeria, and auxiliary buildings are correspondingly cheap. Economy upon these lines should enable real essentials to be supplied such as local water supply, electric power, steam cooking and hot water supply. Re-planning of the Abeokuta general hospital upon these lines has led to a saving of £33,000 upon the original estimate while it has provided nearly twice the amount of actual accommodation for patients.

New X-ray blocks have been built at the African Hospitals at Kaduna and Port Harcourt and these will be ready for occupation early in 1930. A report upon the electro-therapeutical work at Lagos African Hospital is given in Appendix No. F.

A reference to the new system of Native Administration Dispensaries which have been planned will be found in Section IIa.

MEDICAL WORK OF RELIGIOUS MISSIONS.

The missions in Nigeria have not undertaken medical work upon a scale comparable to that which is being carried out in the Belgian-Congo or in Uganda. A considerable amount of valuable work is, however, being done, both as regards general medical work and the treatment of lepers. In the Southern Provinces these medical missions are to some extent self-supporting from the fees charged to patients. During 1929 a Government grant in aid of £6,000 was distributed to various missions to enable extension of work to be carried out, in addition to the special grant to the United Free Church Mission for the leper colony at Itu. Some idea of the extent of mission medical effort in the Southern Provinces can be gained from Table which has been compiled from figures kindly supplied by the missions concerned. Information as regards the missions in the Northern Provinces is not yet available.

DENTAL REPORT.

The Government Dentist, Mr. Cunningham, reports as follows upon his work in the Northern Provinces :—

During the year, Kano and Zaria have been visited twice and Jos, Ilorin, Minna and Lokoja, once. The total number of days given to each place is as follows :—Kano, 53; Zaria, 41; Jos, 25; Ilorin, 6; Minna, 3; Lokoja, 10. Kaduna had the remainder of the time.

At all centres, the opportunity for obtaining dental treatment was fully taken advantage of. About fifty *per cent.* of the dental troubles presented to me were of an urgent nature and so, much suffering and consequent loss of efficiency must have been prevented by immediate treatment.

The dental condition of the European showed, on the whole a lower standard than that obtaining for the same class in Great Britain, but I have been unable, so far, to come to any conclusion regarding the cause or causes.

Few of the African officials desired conservative treatment and so for the majority, treatment was by extraction. The dental condition of the Africans presenting themselves showed a very low standard, since about ninety-five *per cent.* show a condition of pyorrhoea alveolaris around three or more teeth. I have been unable to learn the cause of such a high percentage of this disease.

The only notable abnormality, of which I have made models is in the case of an African from Asaba who possesses four extra molars, one on each side of each jaw and in perfect alignment.

The following Table shows the work done between 1st January, 1929 and 31st December, 1929.

	Fillings.	Temporary Fillings and Dress.	Root treat- ment.	Extrac- tions.	Scalings.	Crowns.	Attendances for treat- ment.
European Officials ...	449	185	36	96	156	1	788
African Officials, Wives and Children ...	17	3	—	163	14	—	203
Total ...	466	188	36	259	170	1	991

The Government Dentist, Mr. Pearson, reports as follows upon his work in the Southern Provinces :—

It is gratifying to place on record an increase in the number of European officials attending for treatment, especially for conservative work. At the same time it will be noted there is a slight falling off in the number of African officials who have availed themselves of dental treatment during the present year under consideration. It cannot be too strongly urged on officials and the general public the great saving in time and unpleasantness of the necessity of early treatment.

The appointment of Mr. C. D. Cunningham as Government Dental Surgeon for the Northern Provinces is very welcome. This has enabled me to concentrate on the work of the Southern Provinces. In the past there has only been one dental surgeon for the whole of Nigeria and it was found that the North was only visited for three months in a tour of eighteen months.

Owing to the increased amount of work to be done in Lagos, I have visited the eastern provinces once. Having no mechanic to do the mechanical work has greatly added to my work. Therefore I have tried to centralize the work at Lagos.

TABLE. MEDICAL MISSIONS IN THE SOUTHERN PROVINCES.

	Sacred Heart Hospital, Abeokuta.	Baptist Mission Hospital, Ogbomosho.	Wesleyan Mission Hospital, Ilesha.	C.M.S. Hospital, Iyi-Enu.	* Qua-Iboe Mission, Etinan Uyo.	Itu Mission, Calabar Province.	† Primitive Methodist Mission, Umuahia.	Abura Mission, Ogoja.
Number and places of Hospitals, also number of beds	1 Hospital, 20 Beds.	1 Hospital, 34 Beds	1 Hospital, 24 Beds	1 Hospital, 70 Beds	3 Hospitals, 42 Beds		3 Hospitals, 58 Beds	
Number and places of Dispensaries ...	None	1 each at Oyo, Iwo and Shaki	None	None	Eight		Thirteen	
Number of Doctors Employed ...	One	Three	One	Two	One		One	
Number of Nursing Sisters Employed ...	One	Three	Two	Four	One		Eight	
Number of Missionaries holding Dispenser's Certificates	None	None	None	None	Ten		Nil	
Total number of In-patients treated per annum	400	743	172 in 9 months	744	300		951	311
Total number of Out-patients treated per annum	705	Not available.	2,435	10,023	About 16,000		6,651	
Average daily number of In-patients ...	12.5	Not given	6.5	2 new cases daily	26		49	
Average daily number of Out-patients ...	13.6	Not given	—	86	About 80		74	
Total Out-patient Attendances per annum	4,966	10,293	18,579	22,536	About 30,000		Insufficient records	48,785
Number of N.A.B. or allied injections ...	No record	516	No record	852	No record		17,847	
Any Special work ...	Maternity	Ante-natal clinics and Infant welfare rescue work	Infant welfare; ante-natal; leper treatment	Maternity	Leprosy		Maternity; Ante-natal child welfare	

* Hospitals at Etinan, Ibesit, Itam. Dispensaries Ibuno, Ikot, Ubo, Itam, Ibesit, Oka, Ikot Idong, Mbiotu Oloko.

† Hospitals at Ifa, 18 beds; Ikot-Ekpene, 20 beds; Amachara, 20 beds, Dispensaries 13 Ifa, Ikot-Ekpene, Amachara, Elukhu Oron, Oyubia (Ekot Division) Ibiaku, Ndoro Uzuokoli, Ovim, Ihubi, Agbiam, Igumale.

In concluding this report I should like to express my thanks to both Dr. Gray and Dr. Aitken for their valuable assistance and collaboration.

The number of patients who attended for dental treatment were as follows :—

European officials	...	...	...	...	...	...	362
Native officials	...	...	...	...	...	...	120
Wives and children	...	...	...	...	...	...	25

Figures of the work done :—

Synthetic fillings	...	...	...	...	...	...	147
Amalgams	...	...	...	...	...	...	300
Copper amalgams	...	...	...	...	...	...	30
Gutta percha (temporary fillings)	...	...	...	...	...	...	375
Gutta percha (permanent fillings)	...	...	...	...	...	...	27
Scalings	...	...	...	...	...	...	316
General suppurative cervical periodontitis	...	...	...	...	...	...	200
Extractions	...	...	...	...	...	...	281
Dentures and repairs	...	...	...	...	...	...	109

RAILWAY CONSTRUCTION.

Medical requirements were provided during the year in the Northern Provinces on the Gusau-Kaura Namoda and the Kano-Nguru construction work. During the year the base hospital was moved from Zaria for the former work to Ringin upon the Kano-Nguru line. The following incidence of sickness and deaths were recorded :—

EUROPEAN—IN-PATIENTS.

Thirty-five Cases were treated with three deaths.

EUROPEAN—OUT-PATIENT DEPARTMENT.

Male.	Female.	
51	1	= 52 Cases, no death.

AFRICAN—IN-PATIENTS.

141 Cases were treated with three deaths.

AFRICAN—OUT-PATIENT DEPARTMENT.

Male.	Female.	
7,435	1,488	= 8,923 with eighteen deaths.

The following table shows the case incidence :—

AFRICAN—OUT-PATIENT DEPARTMENT.

Diseases						Male.	Female.	Total.
Malaria	...	...	...	...	...	436	100	536
Small-pox	...	...	...	...	...	29	2	31
Measles	...	...	...	...	...	34	9	43
Influenza	...	...	...	...	...	2	...	2
Dysentery	...	...	...	...	...	98	31	129
Varicella (Chicken-pox)	...	...	...	...	...	21	3	24
Yaws	...	...	...	...	...	7	...	7
Syphilis	...	...	...	...	...	53	7	60
Soft Chancre	...	...	...	...	...	33	1	34
Other Venereal Diseases	...	...	...	...	...	260	5	265
Tumour Non-malignant	...	...	...	...	...	4	1	5
Rheumatism	...	...	...	...	...	430	68	498
Other Anaemias and Chlorosis	...	...	...	...	...	3	...	3
Diseases of the Spleen	...	...	...	...	...	1	...	1
Affection of the Nervous System and Organs of Senses	...	...	...	...	...	15	1	16
Carried forward						1,426	228	1,654

AFRICAN—OUT-PATIENT DEPARTMENT—*continued.*

Diseases.					Male.	Female.	Total.
Brought forward					1,426	228	1,654
Eye Affections	...	...	...	...	146	47	193
Ear Affections	...	...	...	...	22	4	26
Other Diseases of the Heart	...	...	...	...	2	...	2
Haemorrhoids	...	...	...	...	2	...	2
Diseases of the Lymphatic System	...	...	...	...	61	3	64
Coryza	...	...	...	...	13	...	13
Laryngitis	...	...	...	...	1	...	1
Bronchitis	...	...	...	...	538	130	668
Pneumonia	...	...	...	...	31	3	34
Pleurisy	...	...	...	...	9	...	9
Affections of the Lungs	...	...	...	...	1	1	2
Diseases of the Teeth	...	...	...	...	41	9	50
Mouth Affections	...	...	...	...	48	21	69
Affections of the Pharynx or Tonsils	...	...	...	...	17	2	19
Affections of the Stomach	...	...	...	...	132	64	196
Diarrhoea and Enteritis	...	...	...	...	132	56	188
Ankylostomiasis	...	...	...	...	1	...	1
Intestinal Parasites	...	...	...	...	303	89	392
Affections of the Intestines	...	...	...	...	1,222	271	1,493
Affections of the Liver	...	...	...	...	33	...	33
Affections of the Digestive Organs	...	...	...	...	9	1	10
Diseases of the Genito Urinary Systems	...	...	...	...	3	1	4
Diseases of the Genital Organs of Man	...	...	...	...	12	...	12
Affections of the Female Organs	...	...	...	...	...	2	2
Diseases of the Breast	...	...	...	...	...	2	2
Affections of the Skin	...	...	...	...	437	183	620
Diseases of the Bones and Joints	...	...	...	...	56	4	60
Malformations	...	...	...	...	3	...	3
Attacks of poisonous Animals	...	...	...	...	24	5	29
Burns	...	...	...	...	1	...	1
Burns by Fire	...	...	...	...	49	18	67
Wounds	...	...	...	...	6	...	6
Dislocations	...	...	...	...	7	...	7
Other External Injuries	...	...	...	...	1,644	234	1,878
Debility	...	...	...	...	963	99	1,062
Ulcers	...	...	...	...	2	...	2
Pyrexia	...	...	...	...	29	9	38
Ill defined	...	...	...	...	9	2	11
Total					7,435	1,488	8,923

SURGICAL OPERATIONS, 1929.

				Total.	Cured.	Relieved.	Unrelieved.	Died.
A. GENERAL.								
Amputations	...	...		131	110	12	...	9
Appendectomy	...	...		47	40	...	...	7
Buhocele R. Cure	...	...		3	3	...	...	...
Fractures Plated, etc.	...	...		45	42	2	...	1
Herniotomy	...	...		1,208	1,116	44	4	44
Hepatic Abscess (Drainage, etc.)	...	...		1	...	...	...	1
Laparotomy	...	...		29	8	4	3	14
Perforated Gastric Ulcer (Suture)	...	...		1	1	...	...	...
Perforated Duodenal Ulcer (Suture)	...	...		2	2	...	...	...
Hæmorrhoids (Radical Cure)...	...	...		78	70	8	...	...
Colotomy	...	...		2	2	...	...	...
Excision, Benign Tumours and Cysts	...	...		288	282	5	...	1
Excision (Malignant Tumours)	...	...		35	15	13	2	5
Excision Glands	...	...		18	18	...	...	...
Excision Breast	...	...		5	3	2	...	...
Carried forward ...				...	...	...	...	...

SURGICAL OPERATIONS, 1929—*continued.*

				Total.	Cured.	Relieved.	Unrelieved.	Died.
Brought forward ...				...	...	...	...	...
A. GENERAL— <i>continued.</i>								
Enterectomy	...	...		6	3	...	...	3
Sequestrotomy	...	...		104	68	34	...	2
Osteotomy	...	...		11	9	2	...	...
Thyroidectomy	...	...		12	5	2	2	3
Trephining	...	...		2	...	...	...	2
Splenectomy	...	...		1	...	...	...	1
Cholecystomy	...	...		2	1	1	...	...
Tracheotomy	...	...		21	17	2	...	2
Curettage General	...	...		75	49	24	2	...
Skin Grafting	...	...		12	10	2	...	...
Thoractomy	...	...		5	2	1	...	2
Tonsillectomy	...	...		5	5	...	...	...
Other operations	...	...		397	366	23	2	6
B. EYES.								
Cataract	...	...		12	10	2	...	...
Enucleation	...	..		10	7	3	...	...
Other operations	...	...		19	12	7	...	...
C. EAR.								
Mastoid Schwartz operation				1	1	...	...	...
Other operations	...	...		1	1	...	...	...
D. GENITO URINARY, MALE.								
External Urethrotomy	...			31	20	9	2	...
Internal Urethrotomy	...			12	7	5	...	...
Dilation of Stricture	...			289	85	203	...	1
Elephantiasis of Scrotum	...			161	151	5	5	...
Hydrocele (Radical Cure)	...			228	218	6	3	1
Varicocele	...	...		4	4	...	...	...
Circumcision	...	..		692	692	...	...	...
Cystotomy	...	...		25	18	3	2	2
Orchidectomy	...	...		5	5	...	...	...
Other operations	...	...		19	17	1	...	1
E. GENITO URINARY, FEMALE.								
Abdominal Hysterectomy	...			12	9	1	...	2
Elephantiasis	...	...		9	8	1	...	...
Ovariectomy	...	...		3	1	...	...	2
Salpingectomy	...	...		6	6	...	...	...
Hysteropexy	...	...		14	13	1	...	...
Perineorrhaphy	...	...		2	2	...	...	...
Endometritis (Curettage)	...	...		37	24	12	1	...
Colporrhaphy	...	...		1	1	...	...	...
Other operations	...	...		59	48	5	2	4
F. OBSTETRICAL.								
Abortion—Curettage	..			6	5	...	...	1
Forceps Extraction	...			59	43	10	...	6
Podalic Version	...	...		5	5	...	...	...
Craniotomy	...	...		2	2	...	...	...
Ectopic Gestation	...	...		2	1	1	...	...
Cæsarian Section	...	...		1	...	...	...	1
Other operations	...	...		38	32	3	...	3
G. MINOR SURGICAL OPERATIONS.								
Abscesses, General Injuries, etc.	...	...	...	8,113	7,166	855	67	25
Totals	...	...	...	12,424	10,861	1,314	97	152

VII.—PRISONS AND ASYLUMS.

The following figures give a general idea of the health of prisoners in Government prisons during the year.

	Northern Provinces.		Southern Provinces.	
	1928.	1929.	1928.	1929.
Average daily number in Prison ...	728	601	7,078	6,745
Total number on sick list ...	447	333	19,815	19,564
Total number of days on sick list ...	5,667	3,629	55,439	45,153
Average daily sick ...	1·2	·91	54·13	53·6
Total number of deaths ...	28	13	174	163
Death rate per thousand ...	38·4	21·6	24·5	24·1

The following table shows the causes of deaths :—

Northern.				Brought forward ... 73			
Cachexia ...	...	...	1	Fatty degeneration of the Liver	...	...	1
Cancer of Stomach ...	...	...	1	and Heart ...	...	...	1
Chronic Rheumatoid Arthritis ...	...	...	1	Fits ...	...	...	1
Chronic Nephritis ...	...	...	1	Generalised Tuberculosis ...	...	...	1
Dysentery ...	...	...	2	Gonorrhoea ...	...	...	1
Heart Failure ...	...	...	1	Haematuria ...	...	...	1
Pulmonary Tuberculosis ...	...	...	3	Heart Failure ...	...	...	2
Senile Decay ...	...	...	1	Hyperpyrexia ...	...	...	1
Senility and Chronic Myocarditis ...	...	...	1	Inanition and Delusional Insanity	...	...	1
Valvular disease of the Heart ...	...	...	1	Jaundice ...	...	...	1
Total ...	...	...	13	Leprosy ...	...	...	3
Southern.				Lobar Pneumonia ...	...	...	9
Abscess of Lungs ...	...	...	1	Malaria ...	...	...	3
Acute Pericarditis ...	...	...	1	Mitral Stenosis ...	...	...	1
Acute Hepatitis ...	...	...	1	Misadventure ...	...	...	1
Acute Encephalitis ...	...	...	1	Murder ...	...	...	1
Appendicitis ...	...	...	1	Myalgia ...	...	...	1
Bronchitis ...	...	...	1	Myocarditis ...	...	...	1
Broncho-Pneumonia ...	...	...	2	Natural Causes ...	...	...	8
Carcinoma Liver ...	...	...	1	Nephritis ...	...	...	1
Carcinoma of Stomach ...	...	...	1	Poisoning ...	...	...	1
Cerebral Abscess ...	...	...	2	Oedema ...	...	...	1
Cerebral Hæmorrhage ...	...	...	5	Pericarditis ...	...	...	1
Cerebral Meningitis ...	...	...	1	Peritonitis ...	...	...	1
Chronic Bronchitis ...	...	...	4	Pneumonia ...	...	...	19
Chronic Pancreatitis ...	...	...	2	Pulmonary Tuberculosis ...	...	...	5
Cirrhosis of Liver ...	...	...	3	Pyæmia ...	...	...	1
Colic ...	...	...	1	Rupture of the Aortic Valve ...	...	...	1
Congestion of the Lungs ...	...	...	1	Ruptured Spleen ...	...	...	1
Degeneration of muscles of Heart	...	...	1	Small-pox ...	...	...	4
Diarrhoea ...	...	...	8	Splenitis and Debility ...	...	...	1
Dysentery ...	...	...	28	Strangulated Rupture ...	...	...	1
Encephalitis Lethargica ...	...	...	1	Suicide ...	...	...	2
Endocarditis ...	...	...	1	Suppression of Urine ...	...	...	1
Enteritis ...	...	...	4	Syphilis Ulceration vagina and	...	...	1
Epilepsy ...	...	...	1	Rectum Exhaustion ...	...	...	1
Exhaustion due to Mania ...	...	...	1	Tetanus ...	...	...	4
Carried forward ...	...	...	73	Tuberculosis Empyema ...	...	...	1
				Trypanosomiasis ...	...	...	1
				Ulceration of Legs ...	...	...	1
				Volvulus ...	...	...	1
				Wounds ...	...	...	1
				Total ...	...	...	163

NATIVE ADMINISTRATION PRISONS, NORTHERN PROVINCES.

Daily average in Prison	2,413.9
Total number on the sick list	3,905
„ days on the sick list	44,061
„ number died	218

Summary of Causes of Deaths in N.A. Prisons.

Malaria	7
Dysentery	62
Diarrhoea	20
Unrecorded	3
Pneumonia	45
Hepatic Cancer	1
„ Abscess	4
Cirrhosis Liver	1
Cerebro Spinal Meningitis	6
Syphilis	2
Pulmonary Tuberculosis	8
Septicæmia	3
Uræmia	1
Anæmia	3
Pyonephrosis	1
Trypanosomiasis	1
Insanity	6
Typhoid Fever	1
Pericaditis	1
Myocarditis	5
Bronchitis	3
Pleurisy	2
Nephritis	3
Cancer	1
Cystitis	1
Schistosomiasis	3
Chronic Ulcer	6
Septic Athritis	2
Cerebral Injury	1
Local Injury	1
Embolism	1
Tonsillitis	1
Cellulitis	1
Abscess	1
Varicella	1
Gangrene	3
Broncho-Pneumonia	5
Sarcoma	1

NATIVE ADMINISTRATION PRISONS, SOUTHERN PROVINCES.

Total number on sick list	261
„ days on sick list	3,576
„ died	3

ASYLUMS, MENTAL ALIENATION CASES.

The Alienist Medical Officer, Dr. Home, reports as follows :—

There are two asylums in the Southern Provinces for civil lunatics, one at Yaba and one at Calabar. Both are overcrowded, and wards in the prisons are used to meet the demands for accommodation. In the Northern Provinces asylum accommodation is provided by the native administrations, and there is also provision for lunatics in the Government Prison at Lokoja.

During the year plans and estimates have been completed for a large mental hospital at Lafenwa, and it is expected that building will begin in 1930-31.

At Yaba Asylum the health of the patients has been satisfactory. Occupational therapy has been encouraged, and all employable patients have been engaged in agriculture, mat, and basket making and in household tasks.

The patients have been re-classified and graded and are now subjected to a complete physical examination every three months.

The compounds have been improved by the planting of flowers and shrubs, and fruit and vegetable growing has been encouraged.

At Calabar Asylum an improved boundary fence is to be erected, which will add to the comfort of the patients and to the amenity of the district.

Two senior nurses were transferred to Yaba for further training, and were replaced by two senior nurses from Yaba.

The accommodation for lunatics in Lagos Prison has been markedly improved. A larger and airier ward block has been adapted to their use, and arrangements have been made to accommodate female patient at Ikoyi Prison.

No case of general paralysis of the insane was reported during the year. Conditions in Nigeria are markedly favourable to its development, and an attempt is being made to account for its rarity. The Director of the Medical Research Institute has kindly supplied valuable data and stimulating suggestions.

VIII.—METEOROLOGY.

Tables showing comparative monthly rainfall for Lagos and meteorological returns of various stations for 1929 are appended.

IX.—SCIENTIFIC.

The annual reports from the Director of Medical Research Institute, the Tsetse Investigator, the Pathologists at Lagos, Kaduna, Calabar, the Radiologist, Lagos, the Superintendent of the Pharmacy School, the Secretary of the Nigerian Branch of the British Empire Leprosy Relief Association, appear as appendices.

W. B. JOHNSON,
*Director of Medical and Sanitary
Service.*

RETURNS.

(a).—STAFF OF THE DEPARTMENT, 1929.

Title.	Name.	On Leave.		REMARKS.
		From.	To.	
Director of the Medical and Sanitary Service	David Alexander, C.M.G.	1.1.29	8.3.29	Retired, 9.3.29.
Do. do.	W. B. Johnson ...	1.1.29	21.5.29	Promoted D.M. & S.S. on 9.3.29.
Deputy Director of the Medical Service	H. T. Palmer ...	1.1.29	23.4.29	
Assistant Director of the Medical and Sanitary Service	T. M. R. Leonard, D.S.O.	28.5.29	19.11.29	
Do. do.	T. L. Craig ...	21.11.29	31.12.29	
Assistant Director of the Medical Service	S. Goodbrand ...	1.1.29	29.5.29	
Do. do.	J. Y. Wood ...	9.7.29	30.8.29	Retired, 31.8.29.
Do. do.	L. W. Davies, O.B.E.	14.5.29	19.11.29	
Do. do.	J. W. Thomson	28.5.29	5.11.29	
Specialist	H. H. Stewart ...	10.5.29	14.11.29	
Do.	E. C. Braithwaite	10.5.29	14.11.29	
Do.	Frank Ross ...	24.9.29	31.12.29	
Do.	H. R. M. Ferguson	13.3.29	19.9.29	
Senior Medical Officer	G. F. Forde ...	1.8.29	14.12.29	Invalided, 15.12.29.
Do. do.	L. H. Booth ...	1.1.29	5.3.29	Retired, 6.3.29.
Do. do.	A. J. M. Crichton	—	—	
Do. do.	J. W. Thomson ...	28.5.29	5.11.29	Promoted A.D.M.S. 1.4.29.
Do. do.	H. R. M. Ferguson	13.3.29	19.9.29	Promoted Specialist. 4.9.29.
Do. do.	R. H. Nolan ...	1.1.29	23.4.29	
Do. do.	K. K. Grieve ...	10.12.29	31.12.29	
Do. do.	W. E. Glover ...	6.6.29	4.12.29	
Do. do.	J. Lindsay ...	1.1.29	21.2.29	Retired, 22.2.29.
Do. do.	C. G. Grey ...	10.4.29	16.10.29	
Do. do.	C. Kelsall ...	1.1.29	23.4.29	
Do. do.		2.8.29	31.12.29	
Do. do.	W. E. S. Digby ...	1.1.29	21.5.29	
Do. do.	E. Gibson ...	28.5.29	5.11.29	
Do. do.	R. H. Miller ...	1.8.29	19.11.29	
Do. do.	G. E. Craig ...	—	—	
Do. do.	M. Morrison ...	28.5.29	5.11.29	
Pathologist	H. Morrison ...	1.1.29	26.3.29	
Do.		12.4.29	10.9.29	
Do.	G. W. St. Clair Ramsay ...	23.3.29	23.8.29	
Do.	W. E. McCulloch	1.1.29	23.4.29	
Alienist Medical Officer	B. F. Home ...	1.1.29	9.4.29	
Research Medical Officer	R. F. McCall Burnie	1.1.29	24.9.29	
Superintendent Dispenser Training School	Gordon Taylor ...	2.4.29	10.9.29	
Assistant Superintendent Dispenser Training School	E. Arthur ...	—	—	
Medical Officer	R. H. Brierley ...	3.7.29	19.9.29	Retired, 20.9.29.
Do. do.	W. I. Martyn-Clark ...	1.1.29	1.1.29	Transferred 2.1.29 to Gold Coast.
Do. do.	B. J. Courtney ...	19.8.29	30.11.29	Retired, 1.12.29.
Do. do.	W. G. Cobb, D.S.O.	28.5.29	19.11.29	
Do. do.	E. B. L. Anderson	8.5.29	4.10.29	Retired, 5.10.29.
Do. do.	B. W. F. Wood	1.1.29	26.3.29	
Do. do.	H. North ...	16.4.29	14.11.29	
Do. do.	E. Gibson ...	28.5.29	5.11.29	Promoted S.M.O., 22.1.29.
Do. do.	R. H. Miller ...	1.8.29	19.11.29	Promoted S.M.O., 8.2.29.

Title.				Name.	On leave.		REMARKS.
					From.	To.	
Medical Officer	C. Mackey	—	—	Resigned, 13.5.29.
Do.	do.	...	...	J. T. Watt	—	—
Do.	do.	...	...	J. R. C. Stephens	30.4.29	5.11.29
Do.	do.	...	...	L. N. Lee	19.3.29	30.7.29
Do.	do.	...	...	G. E. Craig	—	—
							Transferred from Gambia—Promoted S.M.O., 31.8.29.
Do.	do.	M. Morrison	28.5.29	5.11.29	Invalided, 20.10.29.
Do.	do.	...	...	W. J. McClintock	23.7.29	31.12.29
Do.	do.	...	...	G. D. K. Waldron, M.C.	20.8.29	17.12.29
Do.	do.	...	...	J. B. Steven	1.1.29	21.12.29
Do.	do.	...	...	N. A. Dyce-Sharp	9.7.29	31.12.29
Do.	do.	...	...	D. G. F. Moore	1.1.29	15.1.29
Do.	do.	...	...	C. J. H. Sharp	12.4.29	19.10.29
Do.	do.	...	...	E. W. Adcock	1.1.29	23.4.29
Do.	do.	...	...	R. P. Crawford	16.5.29	19.11.29
Do.	do.	...	...	H. B. Lee, D.S.O., M.C.	22.11.29	31.12.29
Do.	do.	...	...	E. G. A. Don	1.1.29	16.7.29
Do.	do.	...	...	P. J. Caffrey	—	—
Do.	do.	...	...	F. McGrath	1.1.29	29.1.29
Do.	do.	...	...	J. P. Naudi	—	—
Do.	do.	...	...	E. J. Crawford	—	—
Do.	do.	C. E. Sharp	21.4.29	24.9.29	
Do.	do.	...	...	W. Nelson	12.4.29	5.11.29
Do.	do.	...	...	C. Wilson	7.5.29	5.11.29
Do.	do.	...	...	J. R. H. Pasqual	30.4.29	11.12.29
Do.	do.	...	...	F. Herbert King	5.3.29	10.9.29
Do.	do.	...	...	H. C. E. Chantler	1.1.29	26.3.29
Do.	do.	...	...	P. H. Rawson	12.3.29	24.8.29
Do.	do.	...	...	H. B. Boucher	10.12.29	31.12.29
Do.	do.	...	...	T. James	15.4.29	18.9.29
Do.	do.	...	...	N. S. Williams	20.8.29	31.12.29
Do.	do.	...	...	G. Clark	26.11.29	31.12.29
Do.	do.	...	...	D. M. Mackay	18.12.29	31.12.29
Do.	do.	...	...	T. Cullen	8.12.29	31.12.29
Do.	do.	...	...	E. H. L. Le Clezio	—	—
Do.	do.	...	...	H. M. O. Lester	25.6.29	5.11.29
Do.	do.	...	...	G. Sanders	—	—
Do.	do.	...	...	I. G. MacGregor	10.12.29	31.12.29
Do.	do.	...	...	J. C. Paisley	10.12.29	31.12.29
Do.	do.	...	...	C. S. J. Kearney	—	—
Do.	do.	...	...	T. O'Carroll	1.1.29	13.3.29
Do.	do.	...	...	T. B. McAleer	—	—
Do.	do.	...	...	J. S. Robinson	1.1.29	26.3.29
Do.	do.	...	...	G. Simpson	1.1.29	26.3.29
Do.	do.	...	...	J. S. Oliphant	1.1.29	7.3.29
Do.	do.	...	...	W. S. Ormiston	1.1.29	23.0.29
Do.	do.	...	...	A. J. Murray	12.3.29	20.9.29
Do.	do.	...	...	G. G. Brander	19.2.29	13.8.29
Do.	do.	...	...	F. L. G. Selby	12.4.29	24.9.29
Do.	do.	...	...	A. E. F. L. Forbes	5.12.29	31.12.29
Do.	do.	...	...	R. K. Phillips	16.4.29	4.12.29
Do.	do.	...	...	G. V. Fiddian	23.3.29	24.9.29
Do.	do.	...	...	R. N. Hall	30.4.29	8.10.29
Do.	do.	...	...	E. I. Bieber	6.8.29	31.12.29
Do.	do.	...	...	F. Kane	6.8.29	31.12.29
Do.	do.	...	...	C. W. Hope-Gill	29.10.29	31.12.29
Do.	do.	...	...	G. Shearer	20.11.29	31.12.29
Do.	do.	...	...	D. W. McLaren	14.5.29	8.10.29
Do.	do.	...	...	H. M. Soar	—	—
Do.	do.	...	...	C. W. F. Mackay	1.10.29	31.12.29
Do.	do.	...	...	H. C. Weir	—	—
Do.	do.	...	...	A. H. Bean	30.4.29	14.11.29
Do.	do.	...	...	T. H. I. Potts	22.11.29	31.12.29
Do.	do.	...	...	A. C. Lovett-Camp- bell	20.11.29	31.12.29

Title.	Name.	On leave.		REMARKS.
		From.	To.	
Medical Officer	W. H. Emslie ...	—	—	
Do. do.	D. C. G. Hanlon ...	—	—	
Do. do.	G. Winter ...	28.5.29	19.11.29	
Do. do.	C. E. Libert ...	—	—	
Do. do.	G. E. Dodds ...	—	—	
Do. do.	G. M. M. Menzies	—	—	
Do. do.	W. Hunter ...	—	—	
Do. do.	J. G. Green ...	—	—	
Do. do.	D. C. Bell ...	—	—	
Do. do.	J. Crawford ...	—	—	
Do. do.	W. C. Dale ...	—	—	
Do. do.	J. L. Innes ...	—	—	
Do. da.	C. P. Murray ...	—	—	
Do. do.	T. Simpson ...	—	—	
Do. do.	G. H. Henry ...	—	—	
Do. do.	W. McLelland ...	—	—	
Do. do.	J. L. Lockhead ...	—	—	
Do. do.	F. W. W. Fox ...	—	—	
Do. do.	F. C. Cassidy ...	—	—	
Do. do.	R. L. Le Clezio ...	—	—	
Do. do.	L. B. Haye ...	—	—	
Lady Medical Officer ...	H. S. Keer ...	1.1.29	26.6.29	
Do. do.	B. E. Ebdon ...	—	—	
Do. do.	G. Lowe ...	8.1.29	24.7.29	
Medical Officer (African) ...	A. B. W. Smart	—	—	
Do.	S. L. A. Manuwa	7.10.29	12.10.29	
Do.	R. G. A. Savage	—	—	
Junior Medical Officer ...	L. E. R. Henshaw	—	—	
(African)				
Do. do.	J. T. Femi-Pearse	—	—	
TSETSE INVESTIGATION.				
Tsetse Investigator	W. B. Johnson ...	—	—	Promoted D.M. & S.S., 9.3.29.
(Specialist)				
Tsetse Investigator	Ll. Lloyd ...	26.11.29	31.12.29	
Assistant Do.	P. H. Rawson, M.C.	12.3.29	24.8.29	
Do. do.	H. M. O. Lester ...	25.6.29	5.11.29	
Entomologist	A. W. Taylor ...	1.1.29	6.3.29	
Immunologist	R. D. MacKenzie ...	—	—	
MEDICAL RESEARCH.				
Director of Medical Research	A. Connal ...	2.4.29	10.9.29	
Assistant Bacteriologist ...	E. C. Smith ...			
Do. do.	J. A. Young ...	1.1.29	26.3.29	
SANITARY.				
Deputy Director of Sanitary Service	G. J. Pirie ...	—	—	
Assistant Director of Sanitary Service	W. Allan ...			
Senior Sanitary Officer ...	G. C. M. Davies, M.C.	19.1.29 10.12.29	16.7.29 31.12.29	
Do. do.	J. A. A. Duncan	14.5.29	16.10.29	
Do. do.	G. B. Walker ...	2.4.29	24.9.29	
Do. do.	J. Cauchi ...	8.1.29	29.5.29	
Do. do.	G. R. Waller ...	—	—	
Medical Officer of Health ...	J. MacDonald ...	1.1.29	4.6.29	
Do. do.	N. S. Turnbull ...	2.4.29	31.12.29	
Do. do.	J. G. S. Turner ...	1.1.29	2.1.29	
Do. do.	W. C. Smith ...	5.3.29	4.12.29	
Do. do.	A. Robertson ...	1.1.29	21.5.29	
Do. do.	H. P. Fowler ...	3.9.29	31.12.29	
Do. do.	J. D. Horsburgh ...	19.2.29	5.11.29	
Do. do.	L. H. Thomas ...	12.4.29	31.12.29	

Title.				On leave.		REMARKS.
				From.	To.	
Medical Officer of Health	...	...	B. G. T. Elmes	16.4.29	14.11.29	
Do.	do.	...	R. C. Jones	—	—	
Do.	do.	...	G. A. C. Gordon	—	—	
SPECIAL PLAGUE STAFF.						
Senior Sanitary Officer	...	...	Major W. J. E. Bell, D.S.O., R.A.M.C.	26.11.29	31.12.29	
Do.	do.	...	Major R. E. Price, D.S.O., R.A.M.C.	15.10.29	31.12.29	
NURSING STAFF.						
Matron	...	...	L. M. Single	22.1.29	30.7.29	
Do.	...	...	I. J. Evans	—	—	
Senior Nursing Sister	...	...	F. A. King	9.4.29	10.9.29	
Do.	do.	...	E. O'Hara	27.9.29	31.12.29	
Do.	do.	...	L. Mernagh	8.5.29	25.9.29	
Do.	do.	...	W. Norwood	7.6.29	19.11.29	
Do.	do.	...	B. Hulme	14.5.29	19.11.29	
Do.	do.	...	E. N. Price	1.1.29	26.3.29	
Do.	do.	...	M. Slaney	15.10.29	31.12.29	
Do.	do.	...	M. MacDonald	25.9.29	31.12.29	
Do.	do.	...	A. E. Blakemore	1.1.29	15.1.29	
Nursing Sister	...	...	E. M. Scammell	1.1.29	12.3.29	Transferred to Gold Coast on promotion on 13.3.29.
Do.	...	...	E. Cordiner	1.1.29	13.2.29	
Do.	...	...	M. A. L. Gummow	24.10.29	31.12.29	
Do.	...	...	V. M. Gillespie	—	—	Resigned, 22.1.29.
Do.	...	...	I. W. Dron	1.1.29	6.2.29	
Do.	...	...	Freder Roche	20.12.29	31.12.29	
Do.	...	...	C. M. Caulfield	30.4.29	5.11.29	
Do.	...	...	J. M. Garvey	16.4.29	22.10.29	
Do.	...	...	E. Walker	—	—	Resigned, 1.2.29.
Do.	...	...	Ellen Patchell	16.4.29	18.9.29	
Do.	...	...	L. S. Buist	19.3.29	22.8.29	
Do.	...	...	R. Baldock	14.5.29	41.2.29	
Do.	...	...	W. C. Evans	23.7.29	31.12.29	
Do.	...	...	B. Skerritt	28.5.29	31.12.29	
Do.	...	...	E. Taylor-Smith	12.4.29	4.12.29	
Do.	...	...	K. E. Jones	9.7.29	5.11.29	
Do.	...	...	M. A. A. Swyner- ton.	20.8.29	31.12.29	
Do.	...	...	A. F. McTavish	26.9.29	31.12.29	
Do.	...	...	B. M. Thomas	—	—	Resigned, 21.2.29.
Do.	...	...	K. W. Storrier	12.11.29	31.12.29	
Do.	...	...	H. K. Donaldson	—	—	
Do.	...	...	M. Lancaster	—	—	Appointment terminated 26.6.29.
Do.	...	...	C. A. Maule	12.11.29	31.12.29	
Do.	...	...	M. G. Duke	19.1.29	13.8.29	
Do.	...	...	M. Earl	8.1.29	18.6.29	
Do.	...	...	K. L. Cowan	22.1.29	27.6.29	
Do.	...	...	M. Butler	1.1.29	21.5.29	
Do.	...	...	V. S. McAndrew	19.2.29	16.7.29	
Do.	...	...	A. V. Marke	12.3.29	13.8.29	
Do.	...	...	F. M. Harmer	—	—	Resigned 25.1.29 and re-appointed 27.11.29.
Do.	...	...	M. P. Steele	22.1.29	30.7.29	
Do.	...	...	N. M. C. Horrocks	10.5.29	—	Resigned, 7.9.29.
Do.	...	...	J. J. Innes	4.6.29	22.10.29	
Do.	...	...	M. G. Morgan	29.10.29	31.12.29	
Do.	...	...	M. E. Sanders	—	—	
Do.	...	...	G. E. Taylor	—	—	
Do.	...	...	J. Mitchell	—	—	
Do.	...	...	M. O. Motts	—	—	
Do.	...	...	J. P. Aldworth	—	—	
Do.	...	...	M. D. Honeywill	—	—	

TABLE I—(Continued).

Title.			Name.		On leave.		REMARKS.
					From.	To.	
Nursing Sister	...	:	J. M. Bell	...	—	—	
Do.	...	...	G. M. Lloyd	...	—	—	
Do.	...	...	N. M. C. Burns	...	—	—	
Do.	...	...	A. V. Sullivan	...	—	—	
Do.	...	...	B. Wooldridge	...	—	—	
Do.	...	...	N. Harling	...	—	—	
Do.	...	...	D. Prime	...	—	—	
Do.	...	...	E. E. James	...	—	—	
Do.	...	...	B. D. Haigh	...	—	—	
Do.	...	...	K. C. Brown	...	—	—	
Do.	...	...	C. B. Buchan	...	—	—	
Do.	...	...	H. B. Barclay	...	—	—	
Do.	...	...	A. B. Macdonald	...	—	—	

(b) PRINCIPAL MEMBERS OF THE SUBORDINATE STAFF.

Assistant Accountant	...	...	W. J. Bocking	...	—	—	
Office Assistant	...	...	C. G. Hearn	...	23.3.29	10.9.29	
Chief Dispenser and Store-keeper	...	...	E. G. Stoneham	...	12.3.29	10.9.29	
Do.	do.	...	G. H. Green	...	—	—	
Do.	do.	...	E. M. Cragg	...	8.1.29	—	Died, 13.3.29.
Do.	do.	...	E. Attfield	...	17.9.29	31.12.29	
RESEARCH.							
Technical Assistant	...	...	E. F. Hines	...	23.3.29	7.10.29	
Do.	do.	...	F. W. Randoll	...	5.7.29	31.12.29	
Do.	do.	...	R. Bowrey	...	12.11.29	31.12.29	
SANITARY.							
Sanitary Inspector, Grade I.	...	...	N. W. J. Turnbull	...	—	—	
Do.	do.	...	T. H. Smitherman	...	21.6.29	31.12.29	
AFRICAN.							
Chief Clerk	...	...	J. C. Foresythe	...	—	—	
Chief Dispenser	...	...	J. J. Nicol	...	22.2.29	21.5.29	
Do.	...	...	T. J. Watson	...	28.9.29	31.12.29	
Chief Storekeeper	...	...	S. J. Coker	...	—	—	
Assistant Chief Storekeeper	...	...	W. B. Green	...	—	—	
Do.	do.	...	B. E. Bassey	...	—	—	
Senior Dispenser	...	...	T. A. O. Asolo	...	—	—	
Do.	...	...	J. A. Bara-Hart	...	—	—	
Do.	...	...	A. G. da Silva	...	8.7.29	7.9.29	
Do.	...	...	I. N. O. Anthony	...	—	—	
Do.	...	...	F. E. Leigh	...	—	—	
Do.	...	...	O. I. Thomas	...	—	—	
Do.	...	...	D. O. Johnson	...	12.3.29	22.4.29	
Assistant Chief Clerk	...	...	E. B. Beckley	...	—	—	
Do.	do.	...	T. R. Mullen	...	15.7.29	7.10.29	
Do.	do.	...	P. A. Welsing	...	17.3.29	30.7.29	
Do.	do.	...	A. J. Salvador	...	8.7.29	7.10.29	
Do.	do.	...	B. Majekodunmi	...	4.1.29	3.3.29	

(c)—PRINCIPAL APPOINTMENTS, PROMOTIONS AND CHANGES
DURING THE YEAR, 1929.

The following European Officers retired on pension :—

- Dr. Lindsay, Senior Medical Officer.
- „ L. H. Booth, Senior Medical Officer.
- „ D. Alexander, Director of Medical and Sanitary Service.
- „ R. H. Brierley, Medical Officer.
- „ E. B. L. Anderson, Medical Officer.
- „ J. Y. Wood, Assistant Director, Medical Service.
- „ B. J. Courtney, Medical Officer.
- „ W. I. Martyn-Clark was transferred to Gold Coast on promotion as Senior Medical Officer.
- „ G. E. Craig, Medical Officer was transferred from Gambia to Nigeria.
- Drs. C. J. H. Sharp and G. F. Forde were invalided during the year.
- Dr. J. T. Watt, Medical Officer, resigned his appointment.

The following officers were promoted during the year :—

- Dr. W. B. Johnson, Specialist, promoted Director of Medical and Sanitary Service.
- „ E. Gibson, Medical Officer, promoted Senior Medical Officer.
- „ R. H. Miller, Medical Officer, promoted Senior Medical Officer.
- „ H. R. M. Ferguson, Senior Medical Officer, promoted Specialist.
- „ T. L. Craig, Assistant Director of Medical Service, promoted Assistant Director of Medical and Sanitary Service.
- „ J. W. Thomson, Senior Medical Officer, promoted Assistant Director of Medical Service.
- „ G. E. Craig promoted Senior Medical Officer.
- „ M. Morrison promoted Senior Medical Officer.

AFRICAN.

- Dr. S. L. A. Manuwa, Junior Medical Officer, promoted Medical Officer.
- „ R. G. A. Savage, Junior Medical Officer, promoted Medical Officer.

NEW APPOINTMENTS.

- Nineteen Medical Officers were appointed during the year (two were transferred to the Sanitary Branch as Medical Officers of Health and one to the Laboratory).
- Dr. R. C. Jones and Dr. G. A. C. Gordon were appointed as Medical Officers of Health.
- Dr. R. D. MacKenzie was appointed Immunologist, Research Institute, but seconded to Tsetse Investigation for duty.
- Mr. R. S. Marshall was appointed Assistant Veterinary Pathologist.
- „ E. Arthur was appointed Assistant Superintendent, Dispensers' Training School.
- Six European Sanitary Inspectors, Grade II, were appointed.
- Mr. R. Bowrey, European Sanitary Inspector, Grade II, transferred to the Research Institute as Technical Assistant.

AFRICAN.

- One Junior Medical Officer was appointed (Dr. Femi Pearse).
- Mr. E. M. Cragg, Hospital Dispenser and Storekeeper, died in England and Mr. E. Attfield appointed in his stead.

NURSING STAFF.

Miss I. J. Evans, Senior Nursing Sister, Gold Coast, was transferred to Nigeria on promotion as Matron.

Miss E. M. Scammell, Nursing Sister, Nigeria, was transferred to Gold Coast on promotion.

Nineteen Nursing Sisters were appointed during the year, and one was re-appointed making a total of twenty.

Six Nursing Sisters resigned their appointments (Misses Gillespie, Harmer, Walker, Horrocks, B. M. Thomas, M. A. A. Swynnerton), Miss Harmer was re-appointed during the year as Nursing Sister.

The appointment of one Nursing Sister was terminated.

There were four vacancies among Nursing Sisters at the end of the year.

TABLE II.

FINANCIAL.

*I.—Expenditure.**(a).—PERSONAL EMOLUMENTS.**(1) MEDICAL.*

Administrative Officers	}	<u>£194,301</u>
Specialists	...	...	...
Senior Medical Officers	...	...	...
Medical Officers (European and African)	...	...	...
Dental Surgeon	...	...	...
European Nursing Staff	...	...	...
Clerical Staff	...	...	...
Dispensers and African Nursing Staff	...	...	...
Other Items under Personal Emoluments	...	...	...

(2) SANITATION.

Administrative Officers	}	<u>£41,483</u>
Health Officers	...	...	...
European Sanitary Inspectors	...	...	...
African Sanitary Inspectors	...	...	...
Other Items under Personal Emoluments	...	...	...

(3) MEDICAL RESEARCH.

European Staff	}	<u>£4,640</u>
African Staff		

*(b)—OTHER CHARGES.**(1) MEDICAL.*

					£
Railway Transport	...	...	...	...	6,612
Medical, Surgical, Dental and X-Ray Equipment and Supplies	...	...	...	...	28,118
Diets, Provisions and Necessaries	...	...	...	...	16,863
Other Items under Other Charges	...	...	...	...	24,661
					<u>£76,354</u>

SPECIAL EXPENDITURE.

	£
Tsetse Fly Investigation	15,877
Hospital Equipment	2,204
Other Items under Other Charges ...	11,411
	<u>£29,492</u>

(2) SANITATION.

	£
Railway Transport	1,170
General Sanitary	31,419
Plague Expenses	31,101
Special Expenditure	1,896
Other Items under Other Charges ...	20,413
	<u>£85,999</u>

(3) MEDICAL RESEARCH.

	£
Railway Transport	21
Other Items under Other Charges ...	2,536
	<u>£2,557</u>

TOTAL, MEDICAL AND SANITARY EXPENDITURE £427,629

II.—Receipts.

	£	s.	d.
Hospital and Medical Receipts	10,790	0	0
Births and Deaths	12	6	0
	<u>£10,802</u>	<u>6</u>	<u>0</u>

INTER DEPARTMENTAL SERVICES.

RECEIPTS AND EXPENDITURE, MEDICAL DEPARTMENT, FOR THE YEAR 1929.

RECEIPTS.				EXPENDITURE.			
	£	s.	d.		£	s.	d.
Hospital and Medical Receipts for the year 1929	10,802	6	0	Marine Services to Medical and Sanitary Department	1,638	14	9
Grant from the Medical Research Council ...	500	0	0	Electric Light	3,051	14	1
Medical charges against the Nigerian Railway ...	30,603	0	0	Water	1,457	10	0
Sanitary charges against the Nigerian Railway ...	1,518	0	0	Railway Services	8,331	0	7
Excess of Expenditure over Receipts	405,881	13	5	Total Personal Emoluments (Medical, Sanitary and Research)	240,424	0	0
	<u>£449,304</u>	<u>19</u>	<u>5</u>	Other Charges (Medical, Sanitary and Research)	194,402	0	0
					<u>£449,304</u>	<u>19</u>	<u>5</u>

COMPARATIVE MONTHLY RAINFALL—LAGOS, 1919-1929.

Month.	YEAR.											
	1919.	1920.	1921.	1922.	1923.	1924.	1925.	1926.	1927.	1928.	1929.	
January	0·12	0·37	0·31	0·59	0·89	1·94	1·50	...	2·49	1·77	·02	
February	2·74	0·11	0·02	0·81	1·22	1·12	0·40	3·01	2·35	2·22	1·46	
March	5·98	3·78	3·42	1·50	2·60	5·28	6·61	2·74	2·78	8·20	1·73	
April	3·96	5·71	4·81	7·42	6·43	7·55	7·00	12·76	3·37	6·96	7·04	
May	8·58	8·91	21·55	8·13	13·55	3·45	12·16	13·69	8·19	15·33	11·34	
June... ..	8·31	14·97	15·34	26·36	25·08	5·53	20·40	13·06	7·08	21·05	24·79	
July	0·86	9·55	16·86	2·75	10·44	2·48	15·22	10·07	8·57	2·53	19·93	
August	0·20	1·36	3·53	5·73	0·12	0·10	1·28	0·26	0·25	2·05	·81	
September	2·74	0·45	7·94	11·32	3·15	4·10	5·98	11·05	3·04	5·60	3·11	
October	8·96	5·06	3·74	15·40	5·36	15·62	2·98	3·79	13·33	12·67	6·03	
November	4·66	2·79	3·35	3·51	2·72	0·83	2·87	5·47	2·38	·54	4·10	
December	1·28	0·04	2·35	0·85	...	1·92	...	0·07	1·17	·13	6·02	
Total	48·39	53·10	83·22	84·37	71·56	49·92	76·40	75·97	55·00	79·05	86·38	

TABLE III.
METEOROLOGICAL RETURNS FOR 1929.

STATION.	Absolute Shade Max.	Absolute Shade Min.	Average Max.	Average Min.	Relative Humidity.	Rainfall inches.
	°		°			
Ilorin	97·4	56·5	91·3	68·2	82·3	51·92
Kaduna	95·8	55·4	87·6	64·6	65·1	57·91
Maiduguri	109·1	58	95·9	68·5	63·6	28·02
Kano	105·5	52·9	93·3	66·2	50·2	32·83
Lokoja	98·7	66·4	91·8	73·5	77·5	48·54
Yola	99·8	62·4	91·9	70·4	78·3	42·77
Lagos	88	71·8	85·4	74·7	78·3	86·38
Ibadan	92·6	62	86·3	70·1	79·6	51·20
Calabar	90·3	60·2	86·4	69	88·1	128·58
Enugu	93·1	67·4	85·3	71·8	85	60·54

TABLE IV.
RETURN OF DISEASES AND DEATHS (EUROPEAN)
FOR THE YEAR 1929.

Diseases.	IN-PATIENTS.					OUT-PATIENTS.		
	Remaining in Hospital at end of 1928.	TOTAL.		Total cases treated.	Remaining in Hospital at end of 1929.	Male.	Female.	Deaths.
		Admis- sions.	Deaths.					
I.— <i>Epidemic, Endemic, and Infectious Diseases.</i>								
1. Enteric Group—								
(a) Typhoid Fever ...	1	3	...	4	...	...	...	...
(b) Paratyphoid A. ...	...	3	...	3	...	...	...	...
(c) Paratyphoid B. ...	...	2	1	2	...	1	...	...
(d) Type not defined ...	...	1	...	1	...	...	...	...
2. Typhus ...	...	...	...	...	...	...	...	...
3. Relapsing Fever ...	...	...	...	...	...	...	...	...
4. Undulant Fever ...	...	...	...	...	...	...	...	...
5. Malaria—								
(a) Tertian ...	...	8	...	8	...	4	1	...
(b) Quartan ...	...	...	...	...	...	1	...	...
(c) Aestivo-autumnal ...	16	361	4	377	4	859	81	1
(d) Cachexia ...	...	1	...	1	...	12	1	...
(e) Blackwater ...	...	6	4	6	...	8	1	2
6. Smallpox—								
Alastrim ...	...	...	...	...	...	...	...	...
7. Measles ...	...	1	...	1	...	5	...	...
8. Scarlet Fever ...	1	...	...	1	...	...	...	...
9. Whooping Cough...	...	...	...	...	...	...	...	...
10. Diphtheria ...	...	...	...	...	...	...	...	...
11. Influenza ...	1	36	...	37	1	155	17	...
12. Miliary Fever ...	...	...	...	...	...	...	...	...
13. Mumps ...	...	1	...	1	...	1	...	...
14. Cholera ...	...	...	...	...	...	...	...	...
15. Epidemic diarrhoea ...	...	...	...	...	...	...	...	...
16. Dysentery—								
(a) Amœbic ...	1	37	...	38	1	64	9	...
(b) Bacillary ...	...	20	1	20	1	14	2	...
(c) Undefined or due to other causes ...	...	6	...	6	...	15	1	...
17. Plague—								
(a) Bubonic ...	...	...	...	...	...	...	...	...
(b) Pneumonic ...	...	...	...	...	...	...	...	...
(c) Septicaemic ...	...	...	...	...	...	...	...	...
(d) Undefined ...	...	...	...	...	...	...	...	...
18. Yellow Fever ...	...	...	...	...	...	...	...	...
19. Spirochaetosis ictero-haemorrhagica ...	...	...	...	...	...	...	...	...
20. Leprosy ...	...	...	...	...	...	...	...	...
21. Erysipelas ...	...	...	...	...	...	1	...	...
22. Acute Poliomyelitis ...	...	1	...	1	...	...	...	...
23. Encephalitis Lethargica ...	...	...	...	...	...	...	...	...
24. Epidemic Cerebro-spinal Fever ...	...	...	...	...	...	...	...	...
25. Other Epidemic Diseases—								
(a) Rubeola (German Measles) ...	...	1	...	1	...	4	1	...
(b) Varicella (Chicken-pox) ...	...	...	...	...	...	7	2	...
(c) Kala-azar ...	...	...	...	...	...	...	...	...
(d) Phlebotomus Fever ...	...	...	...	...	...	...	1	...
(e) Dengue ...	...	3	...	3	...	11	...	...
Carried forward ...	20	491	10	511	7	1,162	117	3

TABLE IV.—RETURN OF DISEASES AND DEATHS (EUROPEAN)

FOR THE YEAR 1929—*continued*.

Diseases.	IN-PATIENTS.				Remaining in Hospital at end of 1929.	OUT-PATIENTS		
	Remain- ing in Hospital at end of 1928.	TOTAL.		Total cases treated.		Male.	Female.	Deaths
		Admis- sions.	Deaths.					
Brought forward ...	20	491	10	511	7	1,162	117	3
I.— <i>Epidemic, Endemic, and Infectious Diseases</i> —contd.								
Other Epidemic Diseases—								
(f) Epidemic Dropsy
(g) Yaws
(h) Trypanosomiasis	4	...	4	...	8	...	...
26. Glanders
27. Anthrax
28. Rabies
29. Tetanus	1	...
30. Mycosis	3	...	...
31. Tuberculosis, Pulmonary and Laryngeal	7	...	7	...	7	...	...
32. Tuberculosis of the Meninges or Central Nervous System	1	1	1	...	...	...	...
33. Tuberculosis of the Intestines or Peritoneum
34. Tuberculosis of the Vertebral Column	1	...	...
35. Tuberculosis of Bones and Joints
36. Tuberculosis of other organs—								
(a) Skin or Subcutaneous Tissue (Lupus)
(b) Bones
(c) Lymphatic System
(d) Genito-urinary
(e) Other Organs
37. Tuberculosis disseminated—								
(a) Acute
(b) Chronic
38. Syphilis—								
(a) Primary	15	...	15	...	45	...	...
(b) Secondary ...	1	7	...	8	1	28	...	...
(c) Tertiary	4	...	...
(d) Hereditary...
(e) Period not indicated	3	...	...
39. Soft Chancre	4	...	4	...	32	...	...
40. A.—Gonorrhœa and its complications ...	1	9	...	10	...	194	...	...
B.—Gonorrhœal Ophthalmia ...	1	1	...	2	...	...	...	...
C.—Gonorrhœal Arthritis	2	...	2	...	...	...	...
D.—Granuloma Venereum	1	...	...
41. Septicaemia	3	1	3	...	...	...	...
42. Other Infectious Diseases—								
Trypanosomiasis
II.— <i>General Diseases not mentioned above.</i>								
43. Cancer or other malignant Tumours of the Buccal Cavity ...								
Carried forward ...	23	544	12	567	8	1,488	118	3

TABLE IV.—RETURN OF DISEASES AND DEATHS (EUROPEAN)
FOR THE YEAR 1929—*continued*.

Diseases.	IN-PATIENTS.					OUT-PATIENTS.		
	Remaining in Hospital at end of 1928.	TOTAL.		Total cases treated.	Remaining in Hospital at end of 1929.	Male.	Female.	Deaths.
		Admis- sions.	Deaths.					
Brought forward	23	544	12	567	8	1,488	118	3
II.— <i>General Diseases not mentioned above—contd.</i>								
44. Cancer or other malignant Tumours of the Stomach or Liver
45. Cancer or other malignant Tumours of the Peritoneum intestines, Rectum
46. Cancer or other malignant Tumours of the Female Genital Organs
47. Cancer or other malignant Tumours of the Breast	1	...
48. Cancer or other malignant Tumours of the Skin
49. Cancer or other malignant Tumours of Organs not specified	2	...	...
50. Tumours non-Malignant	2	...	2	...	31	...	...
51. Acute Rheumatism	2	...	2	...	34	3	...
52. Chronic Rheumatism	1	18	...	19	...	114	7	...
53. Scurvy (including Barlow's Disease)
54. Pellagra
55. Beri-Beri
56. Rickets	1	...	...
57. Diabetes (not including Insipidus)	2	...	2	...	3	...	...
58. Anæmia—								
(a) Pernicious
(b) Other Anæmias and Chlorosis	10	...	10	...	122	22	...
59. Diseases of the Pituitary Body
60. Diseases of the Thyroid Gland—								
(a) Exophthalmic Goitre
(b) Other diseases of the Thyroid Gland, Myxœdema	2	...	2	...	13	1	...
61. Diseases of the Para-Thyroid Glands...
62. Diseases of the Thymus
63. Diseases of the Supra-Renal Glands
64. Diseases of the Spleen	5	...	...
65. Leukæmia—								
(a) Leukæmia
(b) Hodgkin's Disease
66. Alcoholism	5	...	5	...	3	...	...
67. Chronic poisoning by mineral substances (lead, mercury, &c.)
68. Chronic poisoning by organic substances (Morphia, Cocaine, &c.)
Carried forward	24	585	12	609	8	1,816	152	3

TABLE IV.—RETURN OF DISEASES AND DEATHS (EUROPEAN)
FOR THE YEAR 1929—*continued*.

Diseases.	IN-PATIENTS.					OUT-PATIENTS.		
	Remaining in Hospital at end of 1928.	TOTAL.		Total cases treated.	Remaining in Hospital at end of 1929.	Male.	Female.	Deaths.
		Admis- sions.	Deaths.					
Brought forward	24	585	12	609	8	1,816	152	3
II.— <i>General Diseases not men- tioned above—contd.</i>								
69. Other General Diseases—								
Auto-intoxication ... ..	...	2	...	2	1	3	...	...
Purpura Hæmorrhagica ... ..	...	...	...	...	...	...	...	...
Hæmophilia ... ..	...	...	...	...	...	...	...	...
Diabetes Insipidus ... ..	...	1	...	1	...	...	...	...
Others ... ..	...	...	...	...	...	10	...	...
III.— <i>Affections of the Nervous System and Organs of the Senses.</i>								
70. Encephalitis (not including Encephalitis Lethargica) ... ..	...	...	...	...	...	1	...	...
71. Meningitis (not including Tuberculous Meningitis or Cerebro-spinal Meningitis) ... ..	...	1	1	1	...	...	...	...
72. Locomotor Ataxia ... ..	...	...	...	...	...	...	...	...
73. Other affections of the Spinal Cord ... ..	...	...	...	...	...	...	...	...
74. Apoplexy—								
(a) Hæmorrhage ... ..	...	...	...	...	...	...	...	...
(b) Embolism ... ..	...	...	...	...	...	...	...	...
(c) Thrombosis ... ..	...	1	...	1	...	...	...	...
75. Paralysis—								
(a) Hemiplegia	1	...	...	1	...	1	...	...
(b) Other Paralyzes ... ..	...	1	...	1	...	...	...	...
76. General Paralysis of the Insane ... ..	...	...	...	...	...	...	...	...
77. Other forms of mental Alienation ... ..	...	7	...	7	...	...	...	...
78. Epilepsy ... ..	...	2	...	2	...	...	...	...
79. Eclampsia, Convulsions (non- puerperal) 5 years or over ... ..	...	...	...	...	...	...	...	...
80. Infantile Convulsions ... ..	...	...	...	...	...	...	...	...
81. Chorea ... ..	...	...	...	...	...	...	...	...
82. A.—Hysteria ... ..	...	1	...	1	...	7	1	...
B.—Neuritis ... ..	...	11	...	11	...	88	7	...
C.—Neurasthenia	1	34	...	35	1	97	13	...
83. Cerebral Softening ... ..	...	...	...	...	...	3	...	...
84. Other affections of the Ner- vous System, such as Paralysis Agitans ... ..	...	7	...	7	1	20	3	...
85. Affections of the Organs of Vision—								
(a) Diseases of the eye ... ..	...	...	...	...	...	25	...	...
(b) Conjunctivitis ... ..	...	1	...	1	...	73	2	...
(c) Trachoma ... ..	...	1	...	1	...	1	...	...
(d) Tumours of the Eye ... ..	...	...	...	...	...	3	...	...
(e) Other affections of the Eye	1	3	...	4	...	56	2	...
86. Affections of the Ear or Mastoid Sinus	1	15	...	16	1	400	28	...
Carried forward	28	673	13	701	12	2,604	208	3

TABLE IV.—RETURN OF DISEASES AND DEATHS (EUROPEAN)
FOR THE YEAR 1929—*continued*.

Diseases.	IN-PATIENTS.					OUT-PATIENTS.		
	Remaining in Hospital at end of 1928.	TOTAL.		Total cases treated.	Remaining in Hospital at end of 1929.	Male.	Female.	Deaths.
		Admis- sions.	Deaths.					
Brought forward ...	28	673	13	701	12	2,604	208	
IV.— <i>Affections of the Circulatory System</i>								
87. Pericarditis
88. Acute Endocarditis or Myo- carditis	1	1	1	...	3	1	...
89. Angina Pectoris	1	...	1	...	...	...	...
90. Other Diseases of the Heart— (a) Valvular—
Mitral	1	...	1	...	12	...	1
Aortic	2	1	2	...	...	...	...
Tricuspid
Pulmonary	1	...	...
(b) Myocarditis	5	1	5	...	14	...	...
Others	1	...	...
91. Diseases of the Arteries—
(a) Aneurism
(b) Arterio-Sclerosis	4	...	4	...	2	...	...
(c) Other diseases	1	...	1	...	1	...	...
92. Embolism or Thrombosis (non- cerebral)
93. Diseases of the Veins—
Hæmorrhoids...	8	...	8	...	52	1	...
Varicose Veins...	1	...	1	...	6	...	...
Phlebitis	3	...	3	...	7	1	...
94. Diseases of the Lymphatic System—
Lymphangitis... ..	1	5	...	6	...	15	1	...
Lymphadenitis, Bubo (non- specific)	16	...	16	...	50	2	...
95. Hæmorrhage of undetermined cause	2	...	...
96. Other affections of the Circula- tory System	1	...	1	...	6	1	...
V.— <i>Affections of the Respiratory System.</i>								
97. Diseases of the Nasal Passages—
Adenoids	8	1	...
Polypus	1	...	...
Rhinitis	31	2	...
Coryza	5	...	5	...	179	11	...
98. Affections of the Larynx—
Laryngitis	3	...	3	...	47	7	...
99. Bronchitis—
(a) Acute	14	...	14	1	179	14	...
(b) Chronic	2	...	2	...	23	...	...
100. Broncho-Pneumonia	1	...	1	...	25	6	...
101. Pneumonia—
(a) Lobar	7	1	7	1	2	...	1
(b) Unclassified
102. Pleurisy, Empyema ...	1	13	...	14	1	19	2	...
103. Congestion of the Lungs
104. Gangrene of the Lungs
105. Asthma	6	...	6	...	19	4	...
106. Pulmonary Emphysema
107. Other affections of the Lungs—	1	...	...
Pulmonary Spirochætosis
Carried forward ...	30	773	17	803	15	3,310	262	5

TABLE IV.—RETURN OF DISEASES AND DEATHS (EUROPEAN)

FOR THE YEAR 1929—*continued.*

Diseases.	IN-PATIENTS.					OUT-PATIENTS.		
	Remaining in Hospital at end of 1928.	TOTAL.		Total cases treated.	Remaining in Hospital at end of 1929.	Male.	Female.	Deaths.
		Admis- sions.	Deaths.					
Brought forward	30	773	17	803	15	3,310	262	5
VI.— <i>Diseases of the Digestive System.</i>								
108. A.—Diseases of Teeth or Gums—								
Caries, Pyorrhœa, &c. ...	...	12	...	12	...	229	18	...
B.—Other affections of the Mouth—								
Stomatitis ... ..	...	1	...	1	...	27	3	...
Glossitis, &c. ... ..	...	...	...	...	...	15	2	..
109. Affections of the Pharynx or Tonsils—								
Tonsillitis ... ..	...	20	...	20	...	125	14	...
Pharyngitis ... ..	...	3	...	3	...	119	5	...
110. Affections of the Œsophagus ...	...	...	...	...	...	...	...	...
111. A.—Ulcer of the Stomach ...	...	3	1	3	...	3	1	...
B.—Ulcer of the Duodenum ...	...	3	...	3	...	7	...	...
112. Other affections of the Stomach—								
Gastritis ... ..	..	63	1	63	...	262	18	...
Dyspepsia, &c. ... ..	...	12	...	12	...	272	26	...
113. Diarrhœa and Enteritis—								
Under two years ... ..	...	11	...	11	...	53	12	...
114. Diarrhœa and Enteritis—								
Two years and over ... ..	...	24	...	24	...	252	29	...
Colitis ... ..	...	21	...	21	...	60	8	...
Ulceration ... ..	...	...	...	...	...	2	...	...
114a. Sprue ... ..	...	...	...	...	...	...	...	...
115. Ankylostomiasis ... ..	...	1	...	1	...	...	...	...
116. Diseases due to Intestinal Parasites—								
(a) Cestoda (Tænia) ... ..	...	2	...	2	...	6	...	...
(b) Trematoda (Flukes) ...	...	1	...	1	...	...	...	...
(c) Nematoda (other than Ankylostoma)—	...	...	...	...	...	...	...	...
Ascaris ... ..	...	3	...	3	...	10	1	...
Trichocephalus dispar ...	...	...	...	...	...	...	...	...
Trichina ... ..	...	...	...	...	...	...	...	...
Dracunculus ... ..	...	...	...	...	...	1	...	...
Strongylus ... ..	...	...	...	...	...	...	...	...
Oxyuris ... ..	...	...	...	...	...	2	...	...
(d) Coccidia ... ..	...	...	...	...	...	...	...	...
(e) Other parasites ... ..	...	1	...	1	...	11	2	...
(f) Unclassified ... ..	...	...	...	...	...	6	...	...
117. Appendicitis ... ..	...	32	2	32	2	19	2	...
118. Hernia ... ..	...	6	...	6	...	13	...	...
119. A.—Affections of the Anus, Fistula, &c.	1	6	...	7	...	9	...	...
B.—Other affections of the Intestines—								
Enteroptosis ... ..	...	5	...	5	...	1	...	...
Constipation ... ..	...	7	...	7	...	71	10	...
120. Acute Yellow Atrophy of the Liver ... ..	...	...	...	...	...	...	...	...
121. Hydatid of the Liver ... ..	...	...	...	...	...	...	...	...
Carried forward	31	1,010	21	1,041	17	4,885	413	5

TABLE IV.—RETURN OF DISEASES AND DEATHS (EUROPEAN)
FOR THE YEAR 1929—*continued.*

Diseases.	IN-PATIENTS.					OUT-PATIENTS.		
	Remaining in Hospital at end of 1928.	TOTAL		Total cases treated.	Remaining in Hospital at end of 1929.	Male.	Female.	Deaths.
		Admis- sions.	Deaths.					
Brought forward	31	1,010	21	1,041	17	4,885	413	5
VI.— <i>Diseases of the Digestive System—continued.</i>								
122. Cirrhosis of the Liver—								
(a) Alcoholic ... ..	...	..	...	...	...	...	...	...
(b) Other forms ... ..	...	...	...	...	...	1	...	...
123. Biliary Calculus ... ..	...	...	...	...	...	1	...	...
124. Other affections of the Liver—								
Abscess ... ..	...	3	...	3	...	10	1	...
Hepatitis ... ..	...	8	...	8	1	15	1	...
Cholecystitis... ..	...	1	...	1	...	4	2	...
Jaundice ... ..	...	6	...	6	1	8	...	...
125. Diseases of the Pancreas ... ..	...	...	...	...	...	...	...	...
126. Peritonitis (of unknown cause) ... ..	...	...	...	...	...	...	...	...
127. Other affections of the Digestive System	1	...	...	1	...	10	1	...
VII.— <i>Diseases of the Genito-urinary System (non-Venereal).</i>								
128. Acute Nephritis ... ..	...	2	...	2	...	5	...	...
129. Chronic ... ..	...	...	...	...	...	5	3	...
130. A.—Chyluria ... ..	...	...	...	...	...	...	...	...
B.—Schistosomiasis ... ..	...	...	...	...	...	2	...	...
131. Other affections of the Kidneys—								
Pyelitis, &c. ... ..	...	6	...	6	1	9	...	...
132. Urinary Calculus ... ..	...	4	...	4	...	6	...	...
133. Diseases of the Bladder—								
Cystitis	1	15	...	16	...	48	5	...
134. Diseases of the Urethra—								
(a) Stricture	2	2	...	4	...	8	...	...
(b) Other ... ..	...	11	...	11	1	93	...	...
135. Diseases of the Prostate—								
Hypertrophy ... ..	...	...	...	...	...	1	...	...
Prostatitis	1	3	...	4	1	17	...	...
136. Diseases (non-Venereal) of the Genital Organs of Man—								
Epididymitis ... ..	...	6	...	6	...	20	...	...
Orchitis ... ..	...	9	...	9	...	12	...	...
Hydrocele ... ..	...	1	...	1	...	3	...	...
Ulcer of Penis ... ..	...	2	...	2	...	15	...	...
137. Cysts or other non-malignant Tumours of the Ovaries ... ..	...	...	...	...	...	...	2	...
138. Salpingitis— ... ..	...	1	...	1	...	...	...	...
Abscess of the Pelvis ... ..	...	...	...	...	...	...	...	...
139. Uterine Tumours (non-malignant) ... ..	...	...	...	...	...	...	1	...
140. Uterine Hæmorrhage (non-puerperal) ... ..	...	...	...	...	...	...	2	...
141. A.—Metritis ... ..	...	...	...	...	...	...	6	...
B.—Other affections of the Female Genital Organs ... ..	...	...	...	...	...	...	1	...
Displacements of Uterus ... ..	...	...	...	...	...	...	1	...
Amenorrhœa ... ..	...	1	...	1	...	...	10	...
Dysmenorrhœa ... ..	...	1	...	1	...	...	6	...
Leucorrhœa ... ..	...	...	...	...	...	...	3	...
Carried forward	36	1,092	21	1,128	22	5,178	458	5

TABLE IV.—RETURN OF DISEASES AND DEATHS (EUROPEAN)

FOR THE YEAR 1929—*continued.*

Diseases.	IN-PATIENTS.					OUT-PATIENTS.		
	Remaining in Hospital at end of 1928.	TOTAL.		Total cases treated.	Remaining in Hospital at end of 1929.	Male.	Female.	Deaths.
		Admis- sions.	Deaths.					
Brought forward	36	1,092	21	1,128	22	5,178	458	5
VII.— <i>Diseases of the Genito-urinary System (non-Venereal)</i> —contd.								
142. Diseases of the Breast (non- puerperal)—								
Mastitis ... ..	...	1	...	1	...	...	2	...
Abscess of Breast ... ..	...	...	...	...	...	...	...	...
VIII.— <i>Puerperal State.</i>								
143. A.—Normal Labour ... ..	...	...	...	...	...	...	2	...
B.—Accidents of Pregnancy	...	...	...	...	...	...	...	...
(a) Abortion ... ..	...	2	1	2	...	...	4	...
(b) Ectopic Gestation ... ..	...	...	...	...	...	...	...	...
(c) Other accidents of Preg- nancy ... ..	...	2	...	2	...	...	6	...
144. Puerperal Hæmorrhage ... ..	...	...	...	...	...	...	...	...
145. Other accidents of Parturition	...	...	...	...	...	...	...	...
146. Puerperal Septicæmia ... ..	...	...	...	...	...	...	...	...
147. Phlegmasia Dolens ... ..	...	...	...	...	...	...	...	...
148. Puerperal Eclampsia ... ..	...	...	...	...	...	...	...	...
149. Sequelæ of Labour ... ..	...	...	...	...	...	...	...	...
150. Puerperal affections of the Breast ... ..	...	...	...	...	...	...	...	...
IX.— <i>Affections of the Skin and Cellular Tissues.</i>								
151. Gangrene ... ..	...	...	...	...	...	11	...	...
152. Boil— ... ..	...	37	...	37	...	308	9	...
Carbuncle	2	8	...	10	...	30	1	...
153. Abscess— ... ..	...	12	...	12	3	53	2	...
Whitlow	2	10	...	12	1	52	6	...
Cellulitis	1	28	...	29	...	129	8	...
154. A.—Tinea ... ..	...	...	...	...	...	197	8	...
B.—Scabies ... ..	...	...	...	...	...	29	1	...
155. Other Diseases of the Skin—								
Erythema ... ..	...	1	...	1	...	74	5	...
Urticaria ... ..	...	5	...	5	...	29	6	...
Eczema ... ..	...	9	...	9	1	146	8	...
Herpes ... ..	...	1	...	1	...	24	2	...
Psoriasis ... ..	...	...	...	...	...	14	1	...
Elephantiasis ... ..	...	...	...	...	...	...	...	...
Myiasis ... ..	...	2	...	2	...	4	1	...
Chigoes ... ..	...	...	...	...	...	9	1	...
Cutaneous Leishmaniasis ... ..	...	...	...	...	...	...	...	...
Others ... ..	...	...	...	...	...	37	2	...
X.— <i>Diseases of Bones and Organs of Locomotion (other than Tuberculous).</i>								
156. Diseases of Bones—								
Osteitis ... ..	...	4	...	4	...	12	...	...
157. Diseases of Joints—								
Arthritis ... ..	...	11	...	11	...	26	2	...
Synovitis ... ..	...	4	...	4	...	62	...	...
158. Other Diseases of Bones or Organs of Locomotion ... ..	...	4	...	4	...	56	2	...
Carried forward	41	1,233	22	1,274	27	6,480	537	5

TABLE IV.—RETURN OF DISEASES AND DEATHS (EUROPEAN)
FOR THE YEAR 1929—*continued*.

Diseases.	IN-PATIENTS.					OUT-PATIENTS.		
	Remaining in Hospital at end of 1928.	TOTAL.		Total cases treated.	Remaining in Hospital at end of 1929.	Male.	Female.	Deaths.
		Admis- sions.	Deaths.					
Brought forward	41	1,233	22	1,274	27	6,480	537	5
XI.— <i>Malformations.</i>								
159. Malformations
Hydrocephalus
Hypospadias...
Spina Bifida, etc.
XII.— <i>Diseases of Infancy.</i>								
160. Congenital Debility	1	...	1	...	...	...	...
161. Premature Birth
162. Other affections of infancy
163. Infant neglect (infants of three months or over)
XIII.— <i>Affections of Old Age.</i>								
164. Senility
Senile Dementia
XIV.— <i>Affections produced by External Causes.</i>								
165. Suicide by Poisoning
166. Corrosive Poisoning (Inten- tional)
167. Suicide by Gas Poisoning
168. Suicide by Hanging or Stran- gulation
169. Suicide by Drowning
170. Suicide by Firearms
171. Suicide by cutting or stabbing instruments
172. Suicide by jumping from a height
173. Suicide by crushing
174. Other Suicides
175. Food Poisoning	1	...	1	...	...	...	...
Botulism	3	...	3	...	8	2	...
176. Attacks of poisonous animals
Snake Bite	7	2	...
Insect Bite	2	...	2	...	46	6	...
177. Other accidental Poisonings	...	1	...	1	...	10	...	...
178. Burns (by Fire)	3	1	3	1	10	...	...
179. Burns (other than by Fire)	5	...	5	...	10	1	...
180. Suffocation (accidental)
181. Poisoning by Gas (accidental)
182. Drowning (accidental)	1	...	1
183. Wounds (by Firearms, war excepted)	2	...	2	...	4	...	1
184. Wounds (by cutting or stabbing instruments)	1	...	1	...	33	...	...
185. Wounds (by Fall)	23	...	23	...	135	4	...
186. Wounds (in Mines or Quarries)	8	...	...
187. Wounds (by Machinery)	11	...	...
188. Wounds (crushing, <i>e.g.</i> railway accidents, &c.)	2	1	...
Carried forward	41	1,275	23	1,316	28	6,765	553	7

TABLE IV.—RETURN OF DISEASES AND DEATHS (EUROPEAN)
FOR THE YEAR 1929—continued.

Diseases.	IN-PATIENTS.					OUT-PATIENTS.		
	Remaining in Hospital at end of 1928.	TOTAL.		Total cases treated.	Remaining in Hospital at end of 1929.	Male.	Female.	Deaths.
		Admis- sions.	Deaths.					
Brought forward	41	1,275	23	1,316	28	6,765	553	7
XIV.—Affections produced by External Causes—contd.								
189. Injuries inflicted by Animals, Bites, Kicks, &c.	6	...	6	...	42	3	...
190. Wounds inflicted on Active Service
191. Executions of civilians by belligerents
192. A.—Over fatigue	1	...	1	...	3	...	...
B.—Hunger or Thirst
193. Exposure to Cold, Frost bite, &c.
194. Exposure to Heat— Heatstroke	3	...	3	...	7	1	...
Sunstroke	5	...	5	...	17	1	...
195. Lightning Stroke	3	...	1
196. Electric Shock	1	...	1	...	...	...	...
197. Murder by Firearms
198. Murder by cutting or stabbing instruments
199. Murder by other means
200. Infanticide (Murder of an infant under one year)
201. A.—Dislocation	3	...	3	...	13	1	...
B.—Sprain	16	...	16	1	85	2	...
C.—Fracture	1	27	1	28	2	33	...	...
202. Other External Injuries	44	1	44	1	305	16	...
203. Deaths by Violence of un- known cause
Contusion	10	...	10	...	52	...	...
XV.—Ill-Defined Diseases.								
204. Sudden Death (cause unknown)
205. A.—Diseases not already speci- fied or ill-defined—								
Ascites	1	...	1	...	14	2	...
Œdema	1	...	1	...	21	1	...
Asthenia	22	...	22	1	87	7	...
Shock	2	...	2	...	1	...	...
Hyperpyrexia	2	1	...
B.—Malingering	1	...	1	...	...	...	...
Others	2	...	2	...	6	1	...
XVI.—Diseases, the total of which have not caused 10 Deaths—								
Tropical Ulcers	8	...	8	...	133	3	...
Total	42	1,428	25	1,470	33	7,589	592	8

TABLE V.

RETURN OF DISEASES AND DEATHS (NON-EUROPEAN)
FOR THE YEAR 1929.

Diseases.				IN-PATIENTS.					OUT-PATIENTS.			
				Remaining in Hospital at end of 1928.	TOTAL.		Total cases treated.	Remaining in Hospital at end of 1929.	Male.	Female.	Deaths.	
					Admis- sions.	Deaths.						
I.—Epidemic, Endemic, and Infectious Diseases.												
1. Enteric Group—												
(a) Typhoid Fever				1	4	1	5	1	...	...	...
(b) Paratyphoid A. ... ..				...	2	...	2	...	...	...	...
(c) Paratyphoid B. ... ..				...	...	...	...	...	...	...	...
(d) Type not defined ... ..				...	8	1	8	1	...	...	...
2. Typhus ... ..				...	...	...	...	...	...	...	...
3. Relapsing Fever ... ..				...	59	23	59	1	71	15	...	
4. Undulant Fever ... ..				...	...	...	...	...	...	...	...
5. Malaria—												
(a) Tertian				4	19	...	23	...	52	34	...	
(b) Quartan ... ..				...	1	...	1	...	4	6	...	
(c) Aestivo-autumnal				27	1,593	29	1,620	14	16,589	5,050	9	
(d) Cachexia ... ..				...	10	4	10	...	91	11	1	
(e) Blackwater				4	4	1	8	...	1	...	...
6. Smallpox ... ..				...	388	73	388	43	395	270	8	
Alastrim ... ..				...	1,380	419	1,380	5	295	196	4	
7. Measles ... ..				...	37	1	37	...	100	36	1	
8. Scarlet Fever ... ..				...	...	...	...	...	...	1	...	
9. Whooping Cough ... ..				...	3	...	3	...	152	130	...	
10. Diphtheria ... ..				...	...	...	...	...	...	...	...
11. Influenza				15	194	6	209	5	696	103	...	
12. Miliary Fever ... ..				...	...	...	...	...	...	...	...
13. Mumps ... ..				...	44	...	44	5	190	21	...	
14. Cholera ... ..				...	...	...	...	...	...	...	...
15. Epidemic diarrhoea ... ..				...	1	...	1	...	103	36	...	
16. Dysentery—												
(a) Amœbic				18	677	77	695	14	1,591	540	6	
(b) Bacillary ... ..				...	115	22	115	2	79	26	...	
(c) Undefined or due to other causes				7	205	53	212	2	598	201	...	
17. Plague—												
(a) Bubonic				1	22	10	23	2	1	...	...
(b) Pneumonic ... ..				...	11	11	11	...	...	...	...
(c) Septicæmic ... ..				...	3	3	3	...	...	...	...
(d) Undefined ... ..				...	...	...	...	...	...	...	...
18. Yellow Fever ... ..				...	...	...	...	...	...	...	...
19. Spirochætosis ictero-hæmorrhagica ... ..				...	...	...	...	...	...	...	...
20. Leprosy				297	539	40	836	547	2,376	1,064	1	
21. Erysipelas				1	8	...	9	...	8	2	...	
22. Acute Poliomyelitis				4	16	4	20	...	11	3	...	
23. Encephalitis Lethargica ... ..				...	1	1	1	...	8	1	...	
24. Epidemic Cerebro-spinal Fever				1	55	29	56	2	2	...	...
25. Other Epidemic Diseases—												
(a) Rubeola (German Measles) ... ..				...	12	...	12	...	16	...	...
(b) Varicella (Chicken-pox)				39	1,298	5	1,337	5	1,047	157	...	
(c) Kala-azar ... ..				...	...	...	...	...	1	...	...
(d) Phlebotomus Fever ... ..				...	...	...	...	...	...	...	...
(e) Dengue ... ..				...	...	...	...	...	...	...	...
(f) Epidemic Dropsy ... ..				...	3	...	3	...	1	1	...	
(g) Yaws				39	269	...	308	8	24,309	17,509	...	
(h) Trypanosomiasis				68	985	30	1,053	182	2,839	1,541	15	
Carried forward				526	7,966	843	8,492	839	51,626	26,954	45	

TABLE V.—RETURN OF DISEASES AND DEATHS (NON-EUROPEAN)
FOR THE YEAR 1929—*continued*.

Diseases.					IN-PATIENTS.					OUT-PATIENTS.		
					Remaining in Hospital at end of 1928.	TOTAL.		Total cases treated.	Remaining in Hospital at end of 1929.	Male.	Female.	Deaths.
						Admis- sions.	Deaths.					
Brought forward					526	7,966	843	8,492	839	51,626	26,954	45
I.—Epidemic, Endemic, and Infectious Diseases—contd.												
26.	Glanders	...	...	...	...	...	...	...	...	...	...	...
27.	Anthrax	...	...	...	...	...	...	...	...	...	...	...
28.	Rabies	...	...	...	...	...	...	...	...	...	...	...
29.	Tetanus	...	...	...	3	48	25	51	...	16	8	...
30.	Mycosis	...	...	...	2	21	1	23	1	30	6	...
31.	Tuberculosis, Pulmonary and Laryngeal	...	...	...	20	266	81	286	18	251	78	...
32.	Tuberculosis of the Meninges or Central Nervous System	...	...	...	...	5	5	5	...	8	...	...
33.	Tuberculosis of the Intestines or Peritoneum	...	...	...	...	6	4	6	...	...	3	...
34.	Tuberculosis of the Vertebral Column	...	...	...	3	12	2	15	...	20	7	...
35.	Tuberculosis of Bones and Joints	...	...	...	7	31	4	38	6	29	17	...
36.	Tuberculosis of other organs—											
	(a) Skin or Subcutaneous Tissue (Lupus)	...	...	...	...	3	...	3	1	22	9	...
	(b) Bones	...	...	...	...	2	...	2	...	12	4	...
	(c) Lymphatic System	...	...	...	...	15	1	15	...	37	8	...
	(d) Genito-urinary	...	...	...	...	...	...	...	...	...	...	...
	(e) Other Organs	...	...	...	1	13	1	14	...	15	6	...
37.	Tuberculosis disseminated—											
	(a) Acute	...	...	...	...	2	...	2	...	3	2	...
	(b) Chronic	...	...	...	...	5	2	5	...	13	8	...
38.	Syphilis—											
	(a) Primary	...	...	...	16	295	4	311	19	2,319	843	...
	(b) Secondary	...	...	...	30	419	5	449	27	2,737	1,703	...
	(c) Tertiary	...	...	...	15	389	11	404	28	4,384	1,965	...
	(d) Hereditary	...	...	...	...	35	3	35	10	203	94	...
	(e) Period not indicated	...	...	...	5	106	5	111	11	923	347	...
39.	Soft Chancre	...	...	...	3	68	...	71	10	421	24	...
40.	A.—Gonorrhœa and its complica- tions				22	621	12	643	23	9,419	987	1
	B.—Gonorrhœal Ophthalmia				...	53	2	53	7	246	94	...
	C.—Gonorrhœal Arthritis				3	86	2	89	10	444	43	...
	D.—Granuloma Venereum				1	17	3	18	1	42	59	...
41.	Septicæmia	...	...	...	...	30	17	30	1	24	4	...
42.	Other Infectious Diseases— Trypanosomiasis				...	...	...	...	...	...	...	...
II.—General Diseases not mentioned above.												
43.	Cancer or other malignant Tumours of the Buccal Cavity	...	...	...	1	10	...	11	2	5	...	...
44.	Cancer or other malignant Tumours of the Stomach or Liver	...	...	...	1	17	10	18	...	5	2	...
45.	Cancer or other malignant Tumours of the Peritoneum intestines, Rectum	...	...	...	1	6	...	7	...	2	1	2
46.	Cancer or other malignant Tumours of the Female Genital Organs	...	...	...	...	9	...	9	2	...	7	...
47.	Cancer or other malignant Tumours of the Breast	...	...	...	2	6	...	8	...	2	5	...
48.	Cancer or other malignant Tumours of the Skin	...	...	...	2	23	...	25	1	23	11	...
Carried forward					664	10,585	1,043	11,249	1,017	73,281	33,299	48

TABLE V.—RETURN OF DISEASES AND DEATHS (NON-EUROPEAN)
FOR THE YEAR 1929—continued.

Diseases.	IN-PATIENTS.					OUT-PATIENTS.		
	Remaining in Hospital at end of 1928.	TOTAL.		Total cases treated.	Remaining in Hospital at end of 1929.	Male.	Female.	Deaths.
		Admis- sions.	Deaths.					
Brought forward	664	10,585	1,043	11,249	1,017	73,281	33,299	48
II.—General Diseases not mentioned above—contd.								
49. Cancer or other malignant Tumours of Organs not specified	3	42	14	45	3	29	9	...
50. Tumours non-Malignant	13	258	6	271	12	840	230	...
51. Acute Rheumatism ... ..	...	58	...	58	1	2,514	983	...
52. Chronic Rheumatism	17	465	6	482	12	12,318	3,633	...
53. Scurvy (including Barlow's Disease) ... ..	...	3	...	3	...	...	2	...
54. Pellagra ... ..	...	...	...	...	...	...	...	...
55. Beri-Beri ... ..	...	24	...	24	...	...	...	...
56. Rickets ... ..	...	1	...	1	...	16	13	...
57. Diabetes (not including Insipidus)	1	23	5	24	2	12	5	...
58. Anæmia :—								
(a) Pernicious ... ..	...	3	...	3	...	13	8	...
(b) Other Anæmias and Chloro- sis	10	96	10	106	4	957	345	...
59. Diseases of the Pituitary Body ...	...	...	...	...	...	...	...	...
60. Diseases of the Thyroid Gland ...	...	3	...	3	...	4	4	...
(a) Exophthalmic Goitre ... ..	...	3	1	3	...	57	78	...
(b) Other diseases of the Thy- roid Gland, Myxædema	1	12	1	13	...	72	57	...
61. Diseases of the Para-Thyroid Glands	1	...	...	1	...	...	...	...
62. Diseases of the Thymus ... ..	...	1	...	1	...	1	...	...
63. Diseases of the Supra-Renal Glands ... ..	...	...	...	...	...	3	...	...
64. Diseases of the Spleen ... ..	...	58	6	58	2	898	464	...
65. Leukæmia :—								
(a) Leukæmia ... ..	...	4	...	4	...	5	1	...
(b) Hodgkin's Disease	1	1	...	2	...	5	2	1
66. Alcoholism ... ..	...	11	...	11	...	3	...	...
67. Chronic poisoning by mineral sub- stances (lead, mercury, &c.) ... ..	...	1	1	1	...	2	1	...
68. Chronic poisoning by organic sub- stances (Morphia, Cocaine, &c.) ...	...	...	...	...	...	...	...	...
69. Other General Diseases :—								
Auto-intoxication ... ..	...	...	...	...	...	1	1	...
Purpura Hæmorrhagica ... ..	...	...	...	...	...	...	...	...
Hæmophilia ... ..	...	...	...	...	...	1	...	...
Diabetes Insipidus ... ..	...	1	...	1	...	1	3	...
Others ... ..	...	...	...	...	...	1	...	...
III.—Affections of the Nervous System and Organs of the Senses.								
70. Encephalitis (not including En- cephalitis Lethargica) ... ..	...	3	1	3	...	3	1	...
71. Meningitis (not including Tuber- culous Meningitis or Cerebro- spinal Meningitis) ... ..	...	35	25	35	...	9	1	1
72. Locomotor Ataxia	2	16	1	18	1	4	...	...
73. Other affections of the Spinal Cord	2	13	4	15	3	180	74	...
Carried forward	715	11,720	1,124	12,435	1,057	91,230	39,214	50

TABLE V.—RETURN OF DISEASES AND DEATHS (NON-EUROPEAN)
FOR THE YEAR 1929—*continued.*

Diseases.	IN-PATIENTS.					OUT-PATIENTS.		
	Remaining in Hospital at end of 1928.	TOTAL.		Total Cases treated.	Remaining in Hospital at end of 1929.	Male.	Female.	Deaths.
		Admis- sions.	Deaths.					
Brought forward	715	11,720	1,124	12,435	1,057	91,230	39,214	50
III.— <i>Affections of the Nervous System and Organs of the Senses—contd.</i>								
74. Apoplexy:—								
(a) Hæmorrhage	1	20	11	21	2	9	2	...
(b) Embolism ... ..	...	6	3	6	...	6	1	...
(c) Thrombosis ... ..	...	8	2	8	...	15	2	...
75. Paralysis:—								
(a) Hemiplegia	2	62	7	64	3	56	21	1
(b) Other Paralysis	8	66	9	74	9	100	31	1
76. General Paralysis of the Insane	...	4	...	4	...	11	1	1
77. Other forms of mental Alienation	148	72	18	220	144	84	31	...
78. Epilepsy	3	61	3	64	2	212	62	...
79. Eclampsia, Convulsions (nonpuer- peral) 5 years or over	1	4	2	5	...	9	5	...
80. Infantile Convulsions ... ..	...	14	9	14	1	20	17	3
81. Chorea	1	3	1	4	...	2	1	...
82. A.—Hysteria	2	9	...	11	...	237	81	...
B.—Neuritis	1	49	...	50	2	1,212	244	...
C.—Neurasthenia	2	22	1	24	1	167	26	...
83. Cerebral Softening ... ..	...	5	2	5	...	3	...	...
84. Other affections of the Nervous System, such as Paralysis Agitans ... ..	...	26	...	26	1	351	153	...
85. Affections of the Organs of Vision:—								
(a) Diseases of the eye	2	105	...	107	6	983	146	...
(b) Conjunctivitis	3	144	...	147	6	5,046	1,664	...
(c) Trachoma ... ..	...	21	...	21	2	66	144	...
(d) Tumours of the Eye ... ..	...	18	...	18	...	30	11	...
(e) Other affections of the Eye	8	96	...	104	9	1,222	354	...
86. Affections of the Ear or Mastoid Sinus	1	74	2	75	1	3,652	1,525	1
IV.— <i>Affections of the Circulatory System.</i>								
87. Pericarditis ... ..	...	10	6	10	1	17	14	...
88. Acute Endocarditis or Myocarditis	3	39	17	42	...	56	21	4
89. Angina Pectoris ... ..	...	1	...	1	...	7	...	...
90. Other Diseases of the Heart:—								
(a) Valvular:—								
Mitral	8	96	27	104	...	221	89	2
Aortic	1	17	5	18	...	116	54	...
Tricuspid ... ..	...	1	...	1	...	2	...	...
Pulmonary ... ..	...	2	...	2	...	1	...	...
(b) Myocarditis	4	82	25	86	...	215	54	...
Others ... ..	...	...	...	...	...	23	6	...
91. Diseases of the Arteries:—								
(a) Aneurism	1	9	1	10	...	30	9	...
(b) Arterio-Sclerosis ... ..	...	5	...	5	1	81	28	...
(c) Other diseases ... ..	...	2	...	2	...	28	24	...
92. Embolism or Thrombosis (non- cerebral)	1	2	...	3	...	3	5	...
Carried forward	916	12,876	1,275	13,792	1,248	105,525	44,040	63

TABLE V.—RETURN OF DISEASES AND DEATHS (NON-EUROPEAN) FOR
THE YEAR 1929—*continued*.

Diseases.	IN-PATIENTS.					OUT-PATIENTS.		
	Remaining in Hospital at end of 1928.	TOTAL.		Total cases treated.	Remaining in Hospital at end of 1929.	Male.	Female.	Deaths
		Admis- sions.	Deaths.					
Brought forward	916	12,876	1,275	13,792	1,248	105,525	44,040	63
IV.— <i>Affections of the Circulatory System—contd.</i>								
93. Diseases of the Veins:—								
Hæmorrhoids	6	88	3	94	6	463	132	...
Varicose Veins ... ..	...	13	...	13	...	41	29	...
Phlebitis ... ..	...	8	1	8	...	6	3	...
Others ... ..	...	...	...	...	...	1	...	...
94. Diseases of the Lymphatic System—								
Lymphangitis	1	23	...	24	2	192	47	...
Lymphadenitis, Bubo (non-specific)	7	424	4	431	14	1,719	139	...
95. Hæmorrhage of undetermined cause ... ..	...	3	...	3	...	8	6	...
96. Other affections of the Circulatory System ... ..	...	12	1	12	...	176	65	...
V.— <i>Affections of the Respiratory System.</i>								
97. Diseases of the Nasal Passages—								
Adenoids ... ..	...	9	...	9	...	21	11	...
Polypus ... ..	...	1	...	1	...	8	9	1
Rhinitis ... ..	...	3	...	3	...	154	82	...
Coryza ... ..	...	25	...	25	2	2,914	910	...
98. Affections of the Larynx—								
Laryngitis	1	23	1	24	1	341	199	...
99. Bronchitis—								
(a) Acute	18	514	22	532	17	11,810	3,329	8
(b) Chronic	4	287	9	291	12	4,844	1,776	1
100. Broncho-Pneumonia	7	290	69	297	5	243	129	1
101. Pneumonia—								
(a) Lobar	24	919	204	943	44	276	57	1
(b) Unclassified	8	92	16	100	3	174	38	2
102. Pleurisy, Empyema	6	221	12	227	3	543	159	...
103. Congestion of the Lungs	2	23	...	25	...	42	10	...
104. Gangrene of the Lungs ... ..	...	1	...	1	...	1	...	...
105. Asthma ... ..	...	28	1	28	2	167	32	...
106. Pulmonary Emphysema ... ..	...	8	1	8	...	17	...	...
107. Other affections of the Lungs—								
Pulmonary Spirochætosis ... ..	...	10	1	10	...	8	4	...
Others ... ..	...	7	3	7	1	28	6	...
VI.— <i>Diseases of the Digestive System.</i>								
108. A.—Diseases of Teeth or Gums—								
Caries, Pyorrhœa, &c.	1	48	3	49	1	3,385	1,355	...
B.—Other affections of the Mouth—								
Stomatitis ... ..	...	35	2	35	...	1,063	410	1
Glossitis, &c. ... ..	...	4	...	4	...	738	204	..
Others ... ..	...	1	1	1	...	12	7	...
109. Affections of the Pharynx or Tonsils—								
Tonsillitis	1	69	3	70	2	799	297	...
Pharyngitis ... ..	...	18	2	18	2	435	74	...
Carried forward	1,002	16,083	1,634	17,085	1,365	136,148	53,559	78

TABLE V.—RETURN OF DISEASES AND DEATHS (NON-EUROPEAN) FOR
THE YEAR 1929—*continued*.

Diseases.				IN-PATIENTS.				OUT-PATIENTS.			
				Remaining in Hospital at end of 1928.	TOTAL.		Total cases treated.	Remaining in Hospital at end of 1929.	Male.	Female.	Deaths.
					Admis- sions.	Deaths.					
Brought forward ...				1,002	16,083	1,634	17,085	1,365	136,148	53,559	78
VI.--Diseases of the Digestive System--contd.											
110.	Affections of the Œsophagus ...			...	2	...	2	...	6	2	...
111.	A.—Ulcer of the Stomach ...			...	6	...	6	...	9	...	...
	B.—Ulcer of the Duodenum ...			...	4	2	4	...	2	1	...
112.	Other affections of the Stomach—										
	Gastritis			3	98	2	101	1	2,350	813	...
	Dyspepsia, &c.			2	71	1	73	4	2,680	885	...
113.	Diarrhœa and Enteritis --										
	Under two years			2	128	12	130	1	1,207	563	1
114.	Diarrhœa and Enteritis—										
	Two years and over			14	627	43	641	5	3,575	1,074	...
	Colitis ... ..			...	69	5	69	4	698	269	1
	Ulceration ... ..			...	...	...	...	...	1	1	...
114a.	Sprue ... ..			...	...	...	...	...	1	1	...
115.	Ankylostomiasis			4	138	15	142	3	614	241	...
116.	Diseases due to Intestinal Parasites—										
	(a) Cestoda (Tænia) ... ..			...	38	3	38	...	5,533	538	...
	(b) Trematoda (Flukes) ... ..			...	22	1	22	...	31	13	...
	(c) Nematoda (other than Ankylostoma) ... ..			...	...	...	...	...	4	1	...
	Ascaris			2	92	1	94	1	6,172	4,897	...
	Trichocephalus dispar ... ..			...	2	...	2	...	...	...	...
	Trichina ... ..			...	...	...	...	...	29	6	...
	Dracunculus			11	454	3	465	15	2,437	325	...
	Strongylus ... ..			...	...	...	...	...	1	...	...
	Oxyuris ... ..			...	2	...	2	...	161	52	...
	(d) Coccidia ... ..			...	1	1	1	...	...	...	...
	(e) Other parasites ... ..			...	21	...	21	3	162	148	...
	(f) Unclassified ... ..			...	3	...	3	1	522	243	...
117.	Appendicitis ... ..			...	60	5	60	...	54	6	...
118.	Hernia			84	1,432	48	1,516	88	1,262	96	...
119.	A.—Affections of the Anus, Fistula, &c.			7	97	2	104	11	170	67	...
	B.—Other affections of the Intestines—										
	Enteroptosis ... ..			...	19	2	19	...	18	21	...
	Constipation ... ..			...	78	...	78	1	19,883	5,284	...
	Others ... ..			...	54	3	54	...	53	21	...
120.	Acute Yellow Atrophy of the Liver ... ..			...	...	...	...	...	...	...	...
121.	Hydatid of the Liver ... ..			...	...	...	...	...	2	...	1
122.	Cirrhosis of the Liver—										
	(a) Alcoholic			1	9	4	10	...	12	2	...
	(b) Other forms			1	17	7	18	1	19	10	...
123.	Biliary Calculus ... ..			...	...	...	...	...	4	1	...
124.	Other affections of the Liver—										
	Abscess			3	54	7	57	...	47	8	...
	Hepatitis			2	48	3	50	2	208	79	1
	Cholecystitis ... ..			...	3	...	3	...	9	7	...
	Jaundice			11	98	6	109	1	214	35	...
Carried forward				1,149	19,830	1,810	20,979	1,507	184,298	69,269	82

TABLE V.—RETURN OF DISEASES AND DEATHS (NON-EUROPEAN) FOR
THE YEAR 1929—*continued*.

Diseases.					IN-PATIENTS.				OUT-PATIENTS.			
					Remaining in Hospital at end of 1928.	TOTAL.		Total cases treated.	Remaining in Hospital at end of 1929.	Male.	Female.	Deaths.
						Admis- sions.	Deaths.					
Brought forward					1,149	19,830	1,810	20,979	1,507	184,298	69,269	82
VI.— <i>Diseases of the Digestive System—(contd.)</i>												
125.	Diseases of the Pancreas...	...	...	...	2	5	2	7	...	2	...	...
126.	Peritonitis (cf unknown cause) ...	...	...	...	1	28	17	29	2	18	6	...
127.	Other affections of the Digestive System ... ..	...	...	...	2	45	4	47	...	735	309	...
VII.— <i>Diseases of the Genito-urinary System (non-Venereal)</i>												
128.	Acute Nephritis ... ..	...	...	...	4	69	29	73	9	86	40	...
129.	Chronic ... ..	...	...	...	2	79	23	81	2	87	28	...
130.	A.—Chyluria ... ..	...	...	...	...	...	...	...	...	1	...	...
	B.—Schistosomiasis ... ..	...	...	...	4	43	4	47	4	312	23	...
131.	Other affections of the Kidneys— Pyelitis, &c. ... ..	...	...	...	2	20	4	22	1	36	6	...
132.	Urinary Calculus ... ..	...	...	...	...	6	1	6	...	...	...	...
133.	Diseases of the Bladder— Cystitis ... ..	...	...	...	4	90	5	94	1	810	207	1
134.	Diseases of the Urethra— (a) Stricture ... ..	...	...	...	13	267	8	280	29	494	2	...
	(b) Other ... ..	...	...	...	6	43	4	49	2	156	15	...
135.	Diseases of the Prostate— Hypertrophy ... ..	...	...	...	...	8	2	8	...	25	...	...
	Prostatitis ... ..	...	...	...	...	9	...	9	1	49	...	...
136.	Diseases (non-Venereal) of the Genital Organs of Man—											
	Epididymitis ... ..	...	...	...	5	72	...	77	2	262	...	...
	Orchitis ... ..	...	...	...	1	105	5	106	1	406	...	...
	Hydrocele ... ..	...	...	...	12	258	8	270	14	537	...	...
	Ulcer of Penis ... ..	...	...	...	5	53	1	58	1	315	...	...
	Others ... ..	...	...	...	...	352	1	352	1	697	...	...
137.	Cysts or other non-malignant Tumours of the Ovaries ... ..	...	...	...	1	28	3	29	...	...	54	...
138.	Salpingitis ... ..	...	...	...	...	35	...	35	...	...	130	...
	Abscess of the Pelvis ... ..	...	...	...	...	8	1	8	...	...	10	...
	Others ... ..	...	...	...	...	59	...	59	...	...	...	...
139.	Uterine Tumours (non-malignant)	...	...	...	...	19	2	19	...	...	70	...
140.	Uterine Hæmorrhage (non-puer- peral) ... ..	...	...	...	...	5	1	5	...	...	77	...
141.	A.—Metritis ... ..	...	...	...	3	59	1	62	...	1	205	...
	B.—Other affections of the Female Genital Organs—											
	Displacements of Uterus ... ..	...	...	...	4	21	1	25	...	...	...	...
	Amenorrhœa ... ..	...	...	...	3	50	...	53	6	...	119	...
	Dysmenorrhœa ... ..	...	...	...	...	20	...	20	...	...	346	...
	Dysmenorrhœa ... ..	...	...	...	2	73	...	75	5	...	835	...
	Leucorrhœa ... ..	...	...	...	2	17	...	19	...	...	271	...
	Others ... ..	...	...	...	...	12	...	12	1	...	132	...
142.	Diseases of the Breast (non-puer- peral)—											
	Mastitis ... ..	...	...	...	...	28	...	28	..	8	201	...
	Abscess of Breast ... ..	...	...	...	...	10	...	10	1	1	30	...
Carried forward					1,227	21,826	1,937	23,053	1,590	189,336	72,385	83

TABLE V.—RETURN OF DISEASES AND DEATHS (NON-EUROPEAN) FOR
THE YEAR 1929—*continued*.

Diseases.						IN-PATIENTS.					OUT-PATIENTS.		
						Remaining in Hospital at end of 1928.	TOTAL.		Total cases treated.	Remaining in Hospital at end of 1929.	Male.	Female.	Deaths.
							Admis- sions.	Deaths.					
Brought forward						1,227	21,826	1,937	23,053	1,590	189,336	72,385	83
VIII.— <i>Puerperal State.</i>													
143.	A.—Normal Labour	...	...	...	...	7	225	1	232	3	...	684	...
	B.—Accidents of Pregnancy—	...	...	...	...	...	...	...	...	...	...	13	...
	(a) Abortion	...	...	...	...	1	87	1	88	3	...	170	...
	(b) Ectopic Gestation	...	...	...	...	...	4	...	4	...	...	14	...
	(c) Other accidents of Preg- nancy...	...	...	...	...	1	88	9	89	1	...	120	...
144.	Puerperal Hæmorrhage	...	...	...	...	...	5	1	5	...	...	4	...
145.	Other accidents of Parturition	...	...	...	...	...	72	12	72	5	...	14	...
146.	Puerperal Septicæmia	...	...	...	...	...	8	1	8	1	...	4	...
147.	Phlegmasia Dolens...	...	...	...	...	...	1	...	1	...	...	1	...
148.	Puerperal Eclampsia	...	...	...	...	...	5	2	5	...	...	4	...
149.	Sequelæ of Labour	...	...	...	...	...	8	3	8	...	...	30	...
150.	Puerperal affections of the Breast	...	...	...	...	...	1	...	1	...	...	18	...
IX.— <i>Affections of the Skin and Cellular Tissues.</i>													
151.	Gangrene	...	...	...	...	2	42	12	44	3	107	35	...
152.	Boil	...	...	...	...	1	97	1	98	...	2,202	311	...
	Carbuncle	...	...	...	...	1	17	...	18	1	316	70	...
153.	Abscess	...	...	...	...	31	592	12	623	31	2,553	473	...
	Whitlow	...	...	...	...	5	117	...	122	6	1,494	448	...
	Cellulitis	...	...	...	...	29	683	7	712	27	5,773	1,423	3
154.	A.—Tinea	...	...	...	...	...	43	...	43	2	5,361	961	...
	B.—Scabies	...	...	...	...	5	41	...	46	1	5,790	1,671	...
155.	Other Diseases of the Skin—	...	...	...	...	...	...	...	...	...	...	...	...
	Erythema...	...	...	...	...	...	17	...	17	...	988	119	...
	Urticaria	...	...	...	...	...	11	...	11	...	434	122	...
	Eczema	...	...	...	...	3	36	...	39	1	2,117	191	...
	Herpes	...	...	...	...	...	11	...	11	...	181	50	...
	Psoriasis	...	...	...	...	...	1	...	1	...	154	51	...
	Elephantiasis	...	...	...	...	22	282	4	304	17	292	41	...
	Myiasis	...	...	...	...	...	8	...	8	2	29	30	...
	Chigoes	...	...	...	...	...	2	...	2	...	283	105	...
	Cutaneous Leishmaniasis	...	...	...	...	...	2	...	2	...	3	...	...
	Others	...	...	...	...	22	140	5	162	21	2,094	839	...
X.— <i>Diseases of bones and Organs of Locomotion (other than Tuber- culous).</i>													
156.	Diseases of Bones—	...	...	...	...	...	...	...	...	...	...	...	...
	Osteitis	...	...	...	...	25	183	4	208	23	462	207	...
157.	Diseases of Joints—	...	...	...	...	...	...	...	...	...	...	...	...
	Arthritis	...	...	...	...	15	243	8	258	13	2,855	1,093	...
	Synovitis	...	...	...	...	6	163	1	169	5	1,238	220	...
158.	Other Diseases of Bones or Organs of Locomotion	...	...	...	...	7	108	4	115	3	1,542	196	...
Carried forward						1,410	25,169	2,025	26,579	1,759	225,604	82,117	86

TABLE V.—RETURN OF DISEASES AND DEATHS (NON-EUROPEAN)
FOR THE YEAR 1929—*continued*.

Diseases.	IN-PATIENTS.					OUT-PATIENTS.		
	Remaining in Hospital at end of 1928.	TOTAL.		Total cases treated.	Remaining in Hospital at end of 1929.	Male.	Female.	Deaths.
		Admis- sions.	Deaths.					
Brought forward	1,410	25,169	2,025	26,579	1,759	225,604	82,117	86
XI.— <i>Malformations.</i>								
159. Malformations—	...	1	...	1	1	16	2	...
Hydrocephalus ... ..	...	5	...	5	...	9	6	...
Hypospadias ... ..	...	1	...	1	...	3	...	...
Spina Bifida, etc. ... ..	...	2	...	2	...	17	4	1
XII.— <i>Diseases of Infancy.</i>								
160. Congenital Debility ... ..	...	38	10	38	2	43	31	5
161. Premature Birth ... ..	...	4	2	4	...	1	3	1
162. Other affections of infancy	1	49	12	50	4	237	304	...
163. Infant neglect (infants of three months or over) ... ..	...	13	1	13	...	5	12	...
XIII.— <i>Affections of Old Age.</i>								
164. Senility—	...	9	6	9	...	7	2	...
Senile Dementia ... ..	...	10	5	10	1	20	28	...
XIV.— <i>Affections produced by External Causes.</i>								
165. Suicide by Poisoning ... ..	...	...	...	...	...	...	...	...
166. Corrosive Poisoning (Intentional)	...	...	...	...	...	...	...	...
167. Suicide by Gas Poisoning ... ..	...	...	...	...	...	...	...	...
168. Suicide by Hanging or Strangula- tion ... ..	...	...	...	...	...	...	...	...
169. Suicide by Drowning ... ..	...	...	...	...	...	...	...	...
170. Suicide by Firearms ... ..	...	1	1	1	...	...	...	...
171. Suicide by cutting or stabbing In- struments	2	5	7	1	...	...	...	...
172. Suicide by jumping from a height	...	...	...	...	...	...	...	...
173. Suicide by crushing ... ..	...	...	...	...	...	...	...	...
174. Other Suicides ... ..	...	...	...	...	...	...	...	...
175. Food Poisoning—	...	15	1	15	...	15	3	...
Botulism ... ..	...	...	...	...	...	...	...	...
176. Attacks of poisonous animals ... ..	...	48	4	48	2	110	24	...
Snake Bite ... ..	...	17	...	17	1	233	57	...
Insect Bite ... ..	...	23	9	23	...	35	11	...
177. Other accidental Poisonings	10	124	17	134	9	975	344	...
178. Burns (by Fire)	1	33	5	34	2	309	104	...
179. Burns (other than by Fire) ... ..	...	...	...	...	...	3	1	1
180. Suffocation (accidental) ... ..	...	2	...	2	...	2	...	...
181. Poisoning by Gas (accidental) ... ..	...	1	1	1	...	3	1	2
182. Drowning (accidental)	4	150	12	154	26	99	7	2
183. Wounds (by Firearms, war excepted)	18	509	22	527	42	7,930	1,109	1
184. Wounds (by cutting or stabbing instruments)	19	252	20	271	12	3,628	592	...
185. Wounds (by Fall)	2	97	3	99	6	873	...	...
186. Wounds (in Mines or Quarries)	3	39	3	42	1	2,661	23	...
187. Wounds (by Machinery) ... ..	...	...	...	...	...	...	...	...
Carried forward	1,470	26,617	2,160	28,087	1,868	242,838	84,785	99

TABLE V.—RETURN OF DISEASES AND DEATHS (NON-EUROPEAN),
FOR THE YEAR 1929—continued.

Diseases.	IN-PATIENTS.					OUT-PATIENTS.		
	Remaining in Hospital at end of 1928.	TOTAL.		Total cases treated.	Remaining in Hospital at end of 1929.	Male.	Female.	Deaths.
		Admis- sions.	Deaths.					
Brought forward	1,470	26,617	2,160	28,087	1,868	242,838	84,785	99
XIV.—Affections produced by External Causes—contd.								
188. Wounds (crushing, e.g. railway accidents, etc.)	2	50	4	52	3	339	37	...
189. Injuries inflicted by Animals, Bites, Kicks, etc. ... ..	...	42	1	42	1	846	193	...
190. Wounds inflicted on Active Service ... ..	...	9	...	9	...	130	15	...
191. Executions of civilians by belligerents ... ..	...	2	...	2	...	...	...	...
192. A.—Over fatigue ... ..	...	...	...	...	...	3	...	...
B.—Hunger or Thirst ... ..	...	21	7	21	...	7	...	1
193. Exposure to Cold, Frost bite, etc. ... ..	...	2	2	2	...	...	...	...
194. Exposure to Heat—								
Heatstroke ... ..	...	1	...	1	...	5	1	...
Sunstroke ... ..	...	...	...	...	...	2	...	...
195. Lightning Stroke ... ..	...	2	...	2	...	...	1	...
196. Electric Shock ... ..	...	1	...	1	...	2	...	...
197. Murder by Firearms ... ..	...	...	...	...	...	...	...	...
198. Murder by cutting or stabbing instruments ... ..	...	1	1	1	...	2	...	2
199. Murder by other means ... ..	...	...	...	...	...	...	...	...
200. Infanticide (Murder of an infant under one year) ... ..	...	...	...	...	...	1	...	1
201. A.—Dislocation	2	42	...	44	1	120	26	...
B.—Sprain	1	74	...	75	17	1,522	144	...
C.—Fracture	33	415	30	448	38	343	84	...
202. Other External Injuries	35	802	20	837	25	19,095	2,573	...
203. Deaths by Violence of unknown cause ... ..	...	1	1	1	...	...	...	...
XV.—Ill-Defined Diseases.								
204. Sudden Death (cause unknown) ... ..	...	3	3	3	...	...	...	...
205. A.—Diseases not already specified or ill-defined—								
Ascites	4	93	21	97	4	89	97	2
Œdema	4	37	5	41	3	200	47	...
Asthenia ... ..	...	84	12	84	...	509	166	...
Shock	1	5	...	6	...	5	...	...
Hyperpyrexia ... ..	...	10	3	10	...	156	19	...
B.—Malingering ... ..	...	32	...	32	...	288	5	...
Others ... ..	...	3	...	3	...	196	89	...
XVI.—Diseases, the total of which have not caused 10 Deaths								
Tropical Ulcers	223	1,931	29	2,154	204	26,269	7,955	3
Airhum ... ..	...	9	...	9	1	23	6	...
Impotence ... ..	...	...	...	...	...	56	...	...
Infant Welfare ... ..	...	...	...	...	...	47	71	...
Total	1,779	30,289	2,299	32,068	2,165	294,694	96,314	108

APPENDICES.

APPENDIX A.

ANNUAL REPORT OF THE MEDICAL RESEARCH
INSTITUTE, 1929.

BY

ANDREW CONNAL, M.D., D.P.H., D.T.M. AND H.

Director of Medical Research Institute.

MEDICAL RESEARCH INSTITUTE,

YABA (VIA LAGOS), NIGERIA,

25th March, 1930.

SIR,

I have the honour to present the Annual Report for 1929, which has been condensed as much as possible.

2. Rat plague, as will be seen, shows signs of diminishing intensity.

3. Regarding blackwater fever, it is known that at least three additional cases occurred, the details of which have not yet been obtained. Nevertheless, the total is the lowest for some years.

4. Dr. E. C. Smith continued his dermatological research and he also contributes the notes on intranuclear changes in the liver in yellow fever, the histological findings in a case of blackwater fever, and the paragraph on rabies.

5. Dr. J. A. Young, M.C., devoted his whole attention to "diarrhoea and dysentery".

6. Dr. S. L. M. Connal, M.B.E., presents the usual Entomological report.

7. Dr. B. G. T. Elmes contributes the note on neoplasms.

I have, etc.,

A. CONNAL,

Director of Medical Research Institute.

THE HONOURABLE

THE DIRECTOR OF MEDICAL AND SANITARY SERVICE,
LAGOS.

RAT PLAGUE.

The number of rodents examined in Lagos during 1929 was 75,853, of which 430 were plague-infected. These figures show a slight increase in the number of rodents caught and a marked diminution in the number infected with plague. Table I gives the figures since the beginning of the plague epidemic in 1924.

TABLE I.

Year.	Rats examined.	Rats infected.	Infection-rate.
1924 (last six months)...	6,348	147	1 in 43
1925	36,370	273	1 in 133
1926	42,830	1,020	1 in 42
1927	57,049	676	1 in 84
1928	75,639	1,214	1 in 62
1929	75,853	430	1 in 176
Five and a half years ...	294,089	3,760	1 in 78

The increased number of rats caught each year is a tribute to the efficiency of the measures used, particularly when it is remembered that the longer the war is waged against them the more wary and cunning the rats become. There is some reason, however, to believe that the fecundity of the rat increases to make good the wastage suffered from plague. This is demonstrated in Chart I in which the blue curve represents the average monthly percentage of *pregnant* rats and the red curve shows the average monthly percentage of *plague-infected* rats over the three years' period 1927-1929. From this chart it is seen that plague-infection is most prevalent in the last quarter of the year, and the number of pregnant rats is highest in the second quarter of the year.

The total of 75,853 rodents examined is made up of 71,027 black rats (*Rattus rattus*), 2,906 brown rats (*Rattus norvegicus*), 1,878 "swamp" rats (*Dasymys rufulus*) and forty-two "bush" rats (*Crice-tomys gambianus*). In addition to these, 3,057 shrews (*Crocidura manni*) were examined.

Plague infection was almost entirely confined to the black rats. There were only four infected amongst the brown rats and one in the "swamp" rats. The "bush" rats and the shrews were negative.

The disease in the rats showed its usual seasonal prevalence, there being a comparative lull from March to August and a sharp rise in September to a peak in October. As compared with the previous two years, the weekly curve of percentage rat-infection in 1929 followed that of 1927 more closely than it did that of 1928.

Chart II shows the monthly percentage of infected rats, as a graph, compared with the three previous years 1926, 1927 and 1928.

The sources of the rats were (1), collecting stations (these, of which there were three, were closed down on 12th October); (2), rat-catchers (3), spray-gangs and (4), Port Health Office. The collecting stations supplied 280 positive rats, the rat-catchers, 131; the spray-gangs, fourteen and the Port Health Office, five.

All the infected rats were adults except in the case of thirty-eight which measured less than five inches from the snout to the root of the tail.

The rats were examined in the manner detailed in previous reports, that is, given a serial number, pinned belly uppermost on a

board, with a glass slide bearing the same serial number, a skin incision made from chin to pubis, the skin dissected back, buboes in neck, axilla and groin looked for, then the abdomen and chest opened and the organs exposed. Smears were made of all swellings and of suspected organs and in any case a spleen smear was made from every animal.

The usual signs of plague infection were noted, as under :—

General congestion.—The commonest sign, present in 415 or 96.5% as compared with 92% in 1928.

Pleural effusion.—This was observed in 387 cases or 90% as compared with 79% in 1928. The effusion was haemorrhagic in sixty-five of these cases.

The Liver.—The naked-eye appearance of this organ was noted in 424 cases. As compared with 1928, it will be observed that the “speckled” liver is much more common, an indication probably of a decline in the virulence of the disease, the “speckled” liver being a later stage of the “mottled”. Table II gives the details.

TABLE II.

			1923.	1929.
Mottled	...	...	534=43.98 <i>per cent.</i>	139=32.32 <i>per cent.</i>
Speckled	...	...	232=19.11 “ ”	198=46.04 “ ”
Normal	...	...	115= 9.47 “ ”	17= 3.95 “ ”
Pale ...	...	...	29= 2.38 “ ”	5= 1.16 “ ”
Congested	...	...	28= 2.30 “ ”	7= 1.62 “ ”
Putrid	...	...	276=22.73 “ ”	64=14.88 “ ”

The Spleen.—This organ was congested and enlarged in all the cases in which putrefaction had not destroyed the appearances. A “speckled” spleen was noted in only two cases. In both instances the liver also was speckled. There were bilateral cervical buboes in one case and a mesenteric bubo in the other.

The suprarenals were congested in 335 cases or 77.90% as compared with 520 or 42.75% in 1928.

Intestinal haemorrhage was noted in twenty-nine cases or 6.74% as compared with 135 or 11.12% in 1928. In 1927 one case in seven showed the lesion, in 1928 there was one case in nine, and in 1929 there was one case in fifteen. Table III shows the site of the bubo in the cases which had intestinal haemorrhage.

TABLE III.

				1928.	1929.
No bubo	...	...		16	3
Cervical	...	...		72	13
Cervical and axillary	...	...		2	2
Cervical and groin	...	...		1	—
Axillary	...	...		9	2
Axillary and lumbar	...	...		1	—
Groin ...	...	...		5	1
Groin and lumbar	...	...		11	2
Groin, pelvic and lumbar	...	...		1	—
Pelvic and lumbar	...	...		3	—
Lumbar	...	...		11	1
Mesenteric	...	...		3	5

Subcutaneous haemorrhages were not an outstanding feature. They were observed in the cervical region in twenty-eight and in the flanks in twenty-four but a proportion was probably due to injury. Haemorrhage was only once seen in the axillary region.

Buboes.—These occurred in 398 cases. Thirty-two rats were “ returned ” as showing no bubo. Four are definitely noted as “ missed at PM ” which indicates that general congestion, pleural effusion, congestion and enlargement of the spleen and alteration in the appearance of the liver were not sufficiently obvious to the naked eye to attract suspicion.

Five cases were noted as “ very putrid ” and in two cases the head of the animal was missing. Therefore, it is possible that in eleven cases a bubo was present but was not or could not be observed. In the remaining twenty-one cases the usual signs of plague were observable by the naked eye and it may be accepted that a bubo was definitely absent.

The bubo was single in 233 cases, the site being cervical in 178, axillary in twenty-six, groin in ten, lumbar in ten and mesenteric in nine.

The buboes were bilateral in one region in 110, the situation being cervical in 109 and lumbar in one.

The sites were multiple in fifty-five cases as follows:—

Cervical and axillary in seven; cervical and lumbar in three; cervical, groin and lumbar in two; cervical, axillary, groin and lumbar in one; axillary and lumbar in one; axillary, groin, pelvic and lumbar in two; groin and lumbar in twenty-seven; groin, pelvic and lumbar in five; and pelvic and lumbar in seven.

The cervical region is therefore the most common site, a bubo occurring there in 300 cases. The next commonest site is the lumbar, (fifty-nine), followed by the groin (forty-seven), axillary (thirty-seven), pelvic (fourteen) and mesenteric (nine). Table IV shows the figures for the period October, 1926, to December, 1928 compared with those for 1929.

TABLE IV.

1926-28—2,224 rats.				1929—430 rats.			
Single buboes	...	1,201	54.00 per cent.	Single buboes	...	233	54.16 per cent.
Multiple buboes	...	557	25.04 „	Multiple buboes	...	165	38.37 „
Bubo absent	...	466	20.95 „	Bubo absent	...	32	7.44 „

Table V shows the comparison as regards the frequency of the different buboes.

TABLE V.

		Total.		In combination.	
		1926-28.	1929.	1926-28.	1929.
Cervical	...	1,219	300	94=7.71 per cent.	13=4.33 per cent.
Axillary	...	239	37	67=28.03 „	11=29.72 „
Groin	...	292	47	222=76.02 „	37=78.72 „
Pelvic	...	86	14	57=66.27 „	14=100.00 „
Lumbar	...	208	59	147=70.67 „	48=81.35 „

Table VI shows the proportion of right-sided to left-sided buboes, where the bubo was single, as compared with 1928.

TABLE VI

				1928.	1929.
Cervical	right	...	...	268=55.03 <i>per cent.</i>	105=59.32 <i>per cent.</i>
	left	...	...	219=44.96 "	72=40.67 "
Axillary	right	...	...	49=52.12 "	18=66.66 "
	left	...	...	45=47.87 "	8=33.33 "
Groin	right	...	...	11=78.57 "	4=40.00 "
	left	...	...	3=21.42 "	6=60.00 "
Pelvic	right	...	...	3=100.00 "	—
Lumbar	right	...	...	27=65.85 "	7=77.77 "
	left	..	...	14=34.14 "	2=22.22 "

It should be noted, with regard to the above figures that one cervical bubo and also one lumbar bubo are omitted, as no note was made of the side of the body on which they occurred. The actual disposition of the buboes in their order of frequency is given below.

Bilateral cervical	...	109	Left lumbar	...	...	...	2
Right cervical	...	105	Left cervical and axillary	...	...	...	2
Left cervical	...	72	Bilateral groin and lumbar	...	...	...	2
Right axillary	...	18	Right groin, pelvic and lumbar	...	...	...	2
Right groin and lumbar	...	13	Bilateral lumbar	...	...	...	1
Left groin and lumbar	...	10	Right axillary and lumbar	...	...	...	1
Mesenteric	...	9	Left pelvic and lumbar	...	...	...	1
Left axillary	...	8	Right axillary, left groin, pelvic and lumbar	...	...	...	1
Right lumbar	...	7	Left axillary, groin, pelvic and lumbar...	...	...	...	1
Left groin	...	6	Bilateral groin and left lumbar	...	...	...	1
Right pelvic and lumbar	...	6	Left cervical, right groin and bilateral lumbar	...	...	...	1
Right groin	...	4	Bilateral cervical, right groin and lumbar	...	...	...	1
Right cervical and axillary	4		Right axillary and left cervical	...	...	...	1
Right cervical and lumbar...	3		Left cervical and axillary, bilateral groin and lumbar	...	...	...	1
Left groin, pelvic and lumbar	3		Right groin and left lumbar	...	...	...	1

One cervical and one lumbar bubo are omitted from the list for the reason already given.

The occurrence of mesenteric buboes is interesting. It was stated in a previous report ("Intestinal haemorrhage in rats suffering from septicaemic plague, considered as a factor in the spread of human pneumonic plague", Connal and Paisley, Trans. Roy. Soc. Trop. Med. and Hy. XXI 4, pp. 289-294) that no evidence of a primary alimentary source of the plague infection in the rats was obtained. Further, A. N. Goyle in "a brief report of the plague research work carried out in the United Provinces in 1928" (summarised in "The Indian Medical Year 1928") states "we have not found any rat dead of acute plague with a mesenteric bubo" and again "nor is there any evidence of the rats contracting acute plague in nature by feeding on the carcasses of chronic or acute plague rats".

As will be seen from Table VII a mesenteric bubo has been found in nine plague rats in which intestinal haemorrhage was also present. In 1927 there were three cases of mesenteric bubo, in 1928 there were six, and in the present year (1929) there were nine. The proportion of mesenteric buboes associated with intestinal haemorrhage is high, being one in three in 1927; three in six in 1928; and five in nine in 1929. It will be noted also, from Table VII that in 1927 there were eleven cases of intestinal haemorrhage in which no bubo was found, in 1928 there were sixteen and in 1929 there were only three. It is possible that had more careful search of the mesentery been made in 1927 and in 1928, some of the cases classed as showing no bubo might have been shown to have a mesenteric bubo.

As noted in a previous report, attempts to infect rats with plague by feeding infective material failed, but it is by no means certain that infection cannot occur by the alimentary route, in nature. It is possible also that intestinal infection may follow as the result of the rat crushing and swallowing plague-infected fleas.

TABLE VII.

SHOWING THE SITE OF THE BUBO IN 255 CASES OF INTESTINAL
HAEMORRHAGE.

	1927.	1928.	1929.	Total.
Cervical	56 (359)	72 (701)	13 (287)	141
Axillary	5 (49)	9 (113)	2 (26)	16
Groin and lumbar ... ..	...	11 (87)	2 (27)	13
Lumbar ... ..	...	11 (56)	1 (11)	12
Mesenteric	1 (3)	3 (6)	5 (9)	9
Groin	1 (24)	5 (33)	1 (10)	7
Groin and pelvic	7 (55)	...	...	7
Cervical and axillary	1 (10)	2 (18)	2 (7)	5
Pelvic and lumbar	1 (3)	3 (15)	...	4
Pelvic	4 (27)	...	...	4
Cervical, groin and pelvic	2 (12)	...	...	2
Cervical and groin	1 (5)	1 (4)	...	2
Cervical and lumbar	1 (3)	...	...	1
Axillary and lumbar ... ..	...	1 (8)	...	1
Groin, pelvic and lumbar ... ..	...	1 (7)	...	1
No bubo	11 (98)	16 (138)	3 (32)	30
Total	91 (676)	135 (1,214)	29 (430)	255

Microscopic.—All smears were stained with freshly-prepared carbol thionin blue, which has been found to be the simplest and most reliable stain to use for the purpose of showing up the bi-polarity of the plague organism, *Pasteurella pestis*. The diagnosis, in every case was made only after microscopical examination. No doubtful cases were encountered which required culture on artificial media, or animal inoculation.

In three cases an abscess was found, once in the cervical region, once in the groin and once in the abdominal wall adherent to the spleen. Smears from these showed no *P. pestis* and inoculation of guinea-pigs was negative.

ECTOPARASITES OF LAGOS RODENTS.

The commonest ectoparasite found on the rats was *Xenopsylla cheopis*, of which flea 4,864 specimens were obtained. Next in frequency was *Xenopsylla brasiliensis* of which there were 1,681 examples. Only two other kinds of flea were met with, and these rarely, namely *Ctenocephalus canis*, three specimens and *Echidnophaga sp.* also three specimens. *Laelaps echidninus* numbered 501 and there were 112 examples of *Haematopinus sp.* In addition to these, the larvae of *Cordylobia anthropophaga* were not infrequently seen.

Accurate flea-counts were obtained from 493 live rats.

The average number of fleas per rat per month only twice exceeded five. the figures being 5.41 (sixty-eight rats) in March and fifteen (two rats) in October. The actual figures are given in Table VIII.

TABLE VIII.

	Rats.	Fleas per rat.
January	86	2.10
February	15	2.66
March	68	5.41
April	50	3.98
May	26	4.07
June	67	2.50
July	21	3.33
August	22	3.18
September	23	4.04
October	2	15
November	58	3.41
December	56	3.07

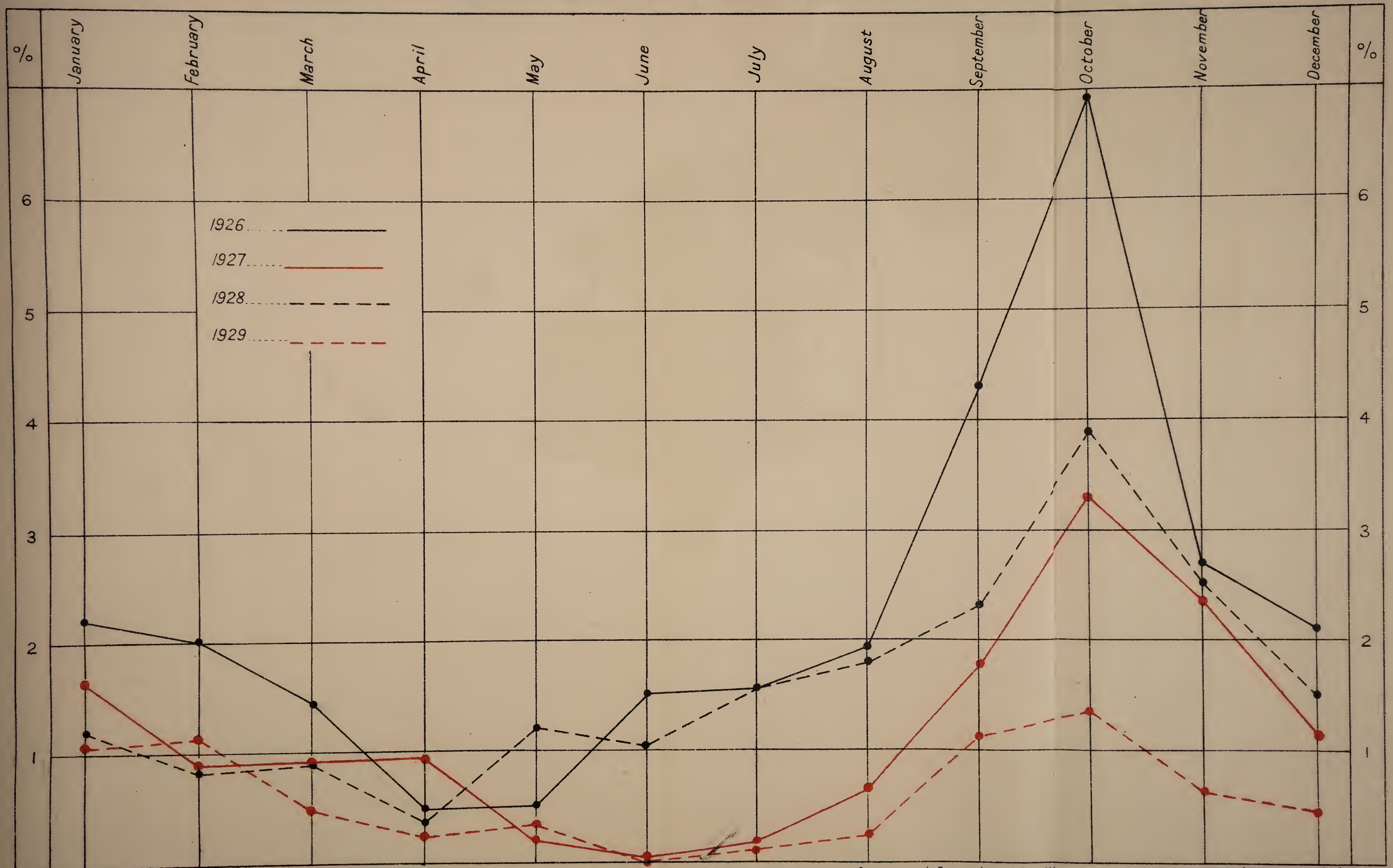
CHART No. 1

MONTHLY PERCENTAGE OF PREGNANT AND PLAGUE - INFECTED RATS
AVERAGE OF THREE YEARS (1927-1929)



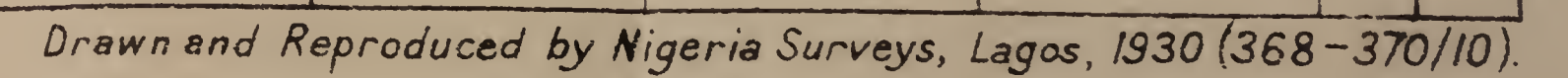
CHART No. 2

MONTHLY AVERAGE PERCENTAGE OF PLAGUE RATS



Drawn and Reproduced by Nigeria Surveys, Lagos, 1930 (367 - 370/10).

FLEAS PER LIVE RAT (3 YEARS AVERAGE - 1927-1929).....
 PERCENTAGE OF PLAGUE RATS " " " -----



The highest daily flea-count in each month was—

January	... 11.5	February	... 7.66	March	... ... 26
April	... ... 17	May	... ... 14.66	June	... ... 9
July	... ... 12	August	... ... 10	September	... ... 15
October	... ... 25	November	... 22.25	December	... ... 8

The highest weekly flea count in each month was—

January	... 2.40	February	... 4.25	March	... ... 8.52
April	... 5	May	... ... 6.37	June	... ... 3.73
July	... 15.66	August	... 4.84	September	... 6.75
October	... 25	November	... 6.36	December	... 5.61

The number of rats on which no fleas were found was—

January	... ... 13	February	... ... 2	March	... ... 12
April	... ... 1	May	... ... 5	June	... ... 12
July	... ... 4	August	... ... 4	September	... 5
October	... ... —	November	... —	December	... 1

Xenopsylla cheopis was more numerous than *X. brasiliensis* in all weekly counts except once in February, (one rat in week ending 18th, one *cheopis*, two *brasiliensis*) once in March, (nine rats in week ending 25th 0.77 *cheopis*, 1.77 *brasiliensis*) once in May (six rats in week ending 27th, 0.50 *cheopis* 1.00 *brasiliensis*), once in October (one rat in week ending 7th, ten *cheopis*, fifteen *brasiliensis*) and once in November (nineteen rats in week ending 25th, 2.68 *cheopis*, 3.68 *brasiliensis*).

The relationship between the number of *X. cheopis* per rat per month and the percentage of plague rats per month is shown in Chart III. The figures are an average of three years, 1927, 1928 and 1929, in each case.

Fleas were also obtained from dead rats but their number cannot be accepted as representing an accurate estimate of the number of fleas per rat. All dead rats are brought to the laboratory in pails of disinfectant fluid and it was after sieving this fluid and washing the deposit that the flea count was made. The fleas, each day were calculated as per 100 rats and the monthly figures are seen in Table IX.

TABLE IX.

		Rats.		Fleas per 100 rats.
January	...	5,502	...	6.61
February	...	5,159	...	7.48
March	...	5,721	...	9.01
April	...	6,352	...	4.62
May	...	6,752	...	4.44
June	...	6,995	...	5.40
July	...	9,161	...	3.83
August	...	8,542	...	3.69
September	...	6,555	...	5.44
October	...	5,433	...	10.62
November	...	4,411	...	14.62
December	...	4,957	...	7.46

DERMATOLOGY.

The number of cases seen during the year at the out-patient department of the African Hospital has been extremely small. As mentioned in the previous report this is due in the main, to the frequent changes of staff and to the rebuilding of the hospital, which still continues. The staff changes were necessarily numerous in the first part of the year owing to the temporary acute shortage of Medical Officers. Natives are shy of men, however capable they may be, that are unknown to them and it requires a period of from six to twelve months before they begin to have confidence and before they will seek medical advice. Any falling off in the attendance will naturally be reflected in the number of dermatological cases seen.

Of those seen, the interesting conditions may be grouped into three categories.

- (1) Streptococcal dermatitis;
- (2) Ducrey infection (*Bacillus* of soft sore);
- (3) Facial tuberculosis.

STREPTOCOCCAL DERMATITIS.—Three common types of streptococcal dermatitis are seen in Lagos :—

- (a) Eczematoid lesions;
- (b) Bullous or vesicular lesions;
- (c) Shallow ulcerations.

Eczematoid lesions.—The regions are inflamed and the skin is dry and presents numerous eroded areas through which can be glimpsed the underlying raw granulating surface. The area may be oedematous and a serous discharge ooze from the fissures. This discharge may become dry and form crusts similar to those seen in impetigo. More usually secondary infections are added causing considerable variations in appearance. Vesicles or small blebs may still be found at the periphery of such infected areas and will point to the true nature of the lesion.

Vesicular or bullous exanthemata.—This type is most marked in infants and is usually confined to the limbs when it may in its early form be mistaken for scabies. Later the vesicles increase in size and the resultant blebs become broken, giving rise to circular raw areas. Such areas rapidly become secondarily infected and ulceration commences.

Ulcerated lesions.—A neglected bullous eruption may frequently become ulcerated at the sites of the broken blebs. The ulcers are as a rule multiple, characteristically shallow, have raw granulating often purulent bases and well defined edges, later becoming irregular by extension. A clear serous exudate oozes continually from the surface of such ulcers.

Diagnosis.—Fluid from the vesicles or bullae when present, was aspirated by a capillary pipette and discharged into a sterile watch glass, an equal quantity of peptone water containing a few drops of blood serum was then added and after mixing, was again aspirated into the pipette. This was then sealed and incubated at 37°C for about ten hours. On examination a white flocculent mass was seen to occupy the lower part of the pipette and this was found microscopically to be composed of long chains of Gram-positive cocci. Subsequently plating out on blood agar showed that the organisms were actively haemolytic.

Treatment.—When not grossly contaminated, little was necessary beyond daily cleansing of the lesions in saline and the application of protective dressings.

DUCREY INFECTIONS.—This is a condition requiring more investigation in Nigeria as it is capable of simulating granuloma inguinale to such an extent that a differential diagnosis becomes impossible without careful bacteriological and histological examination. It is very doubtful if true granuloma inguinale exists in Southern Nigeria. Investigation is rendered particularly difficult owing to the scarcity of such lesions, rendering it impossible to have a number of cases for examination at any one time. The clinical appearance varies with the duration, the initial lesion being the well known “soft sore”, or genital chancre, which may be single or multiple. Later the typical buboes appear in the groin and may prove very refractory to treatment. Such cases present no difficulty in diagnosis but it is when the condition has become ulcerative in type that difficulties will arise.

In the earlier forms these ulcers are obviously the result of broken down buboes and a careful microscopic examination of the discharge will usually reveal the small, Gram-negative pleomorphic organism of Ducrey.

In the older cases, the ulcer has spread serpiginously along the line of the inguinal ligament, possibly extending down on to the scrotum and encircling the lumbar region.

The serpiginous nature of the ulcer is characteristic, it has a raised hard edge, remains shallow with a tendency to undermining at the edges, and presents a moist red granulomatous base. The discharge is scanty and it may be exceedingly difficult to find the causative organism therein.

The following technique was found useful in diagnosis. After thorough cleansing of the ulcerated area with warm saline, it was gently scraped with a small curette and the tissue so obtained emulsified in a little sterile water. A small amount (0.5cc) was then inoculated intracutaneously into the patient's arm. Within three days a small indurated boil developed at the site of inoculation and on examination of the pus large numbers of the organism were found arranged intra-cellularly and in long strands. The pus was infectious for monkeys (*Macacus rhesus*) producing small indurated ulcers lasting a few weeks. Sections of the lesions in the human revealed a chronic infiltration, mainly of plasma-cells.

FACIAL TUBERCULOSIS.—Cases have occurred from time to time, arising within yaws-infested areas, of facial lesions, some papillomatous, others ulcerative in type, which have failed to respond to N.A.B. treatment. Various diagnoses were suggested including leishmaniasis, blastomycosis, tuberculosis and malignant disease. This year, it was possible to examine two such cases in detail. In one case, a young Lagosian girl, kindly sent for examination by Dr. Anders of Ogbomosho, the lesion occupied the greater part of the upper lip, including the mucous membrane and, involving both *alæ nasi* above, it extended symmetrically on either side of the nose to terminate in a raised crescentic hard edge. The area involved was thickened, indurated and raised above the surrounding skin. The surface was partly papillomatous, partly ulcerated. There was no ulceration of the mouth, palate or interior of the nose. From the girl's own statement, the condition had commenced as a small pimple on the upper lip six months previously. She had been given a course of N.A.B. (six injections) without any amelioration taking place in the lesion.

The second case, a boy aged ten years, was seen through the courtesy of Dr. Stephens (Ilorin). The lesion occupied the whole of the upper lip excepting the mucosa, both *alæ nasi* and extended laterally on either side of the nose, this extension being more marked on the right side.

The surface of the lesion was dry, inclined to scaliness and in places papillomatous. No ulceration of the palate or buccal mucosa. The boy, an intelligent Ebo, said that he had suffered from yaws and that the "sickness" began as a "yaws spot" in the nose. In the previous year the boy was given a prolonged course of N.A.B. His general condition improved greatly but the facial lesion remained in *statu quo*. He returned again after an absence of fifteen months—the lesion remaining much the same.

Histology.—In both cases, the salient feature histologically was the preponderance of well-formed giant-cells, lying embedded in the midst of a dense infiltration of round and plasma cells. In places, a suggestion of tubercle formation was noticed. Many sections of both cases were examined for organisms but in only two were acid-fast bacilli found and in both sections the organism was intracellular.

Animal inoculations.—From the first case, a small portion of tissue was removed from the growing edge and after washing in saline, was ground up in a little of the same material. Quantities of this emulsion, varying from $\frac{1}{4}$ to 1.0cc were inoculated subcutaneously into five monkeys (*Macacus rhesus*).

Within five weeks these animals presented irregularly raised bluish-red coloured nodules at the site of inoculation. On incision, a thick tenacious pus exuded which on being stained was found to be rich in acid fast bacilli. Some of this material was diluted in saline and inoculated into guinea-pigs with positive results.

Amongst the items which received attention during the year, mention might be made of—

- (1) Sycosis nuchae;
- (2) Pseudo-leprosy;
- (3) Actinomyces;
- (4) Intranuclear changes in yellow fever.

SYCOSIS NUCHAE.—This condition is common among natives and appears in its earlier form as a number of minute papules in the skin of the back of the neck. These papules emit pus on pressure which contains Gram-positive cocci. In the later stages, the papules are larger and may equal in size that of a pea. Fusion may occur and tufts of shortened hairs usually project from their centres. The final stage presents itself as a large raised keloid-like mass, the edge being irregular depending, as it does, on the fusion of pre-existing papules. The lesions are essentially chronic in their nature and treatment is of little avail except in the early stages.

The condition is regarded as resulting from a chronic infection of the hair follicles with pyogenic staphylococci.

PSEUDO-LEPROSY.—In the *West African Medical Journal* for July, 1928, a full description was given of this leprosy-simulating disease and during this year some good examples have been seen. Sections of the edge of one of these ringed lesions reveal the characteristic infiltration zones containing numerous well-formed giant cells. No acid-fast bacilli could be demonstrated. It is possible that the disease is a form of tuberculosis but experimental work will be necessary before any conclusions can be arrived at.

ACTINOMYCES.—Though the closely allied fungi, the nocardia, seem to be distributed throughout Nigeria, no case has yet been recorded of a proven actinomycotic infection in the native. An indication that the causative fungus, pathogenic at least for animals, is present, is shown by the fact that a spontaneous infection was found in one of the rabbits kept for experimental purposes. The lesion was in the form of a small nodule situated in the subcutaneous tissues of the hind leg. On incision, yellowish coloured grains were easily discernible to the naked eye and when sectioned they appeared as radiating, intensely acid-fast masses showing marked branching and club formation. Cultures were attempted but were unsuccessful.

INTRANUCLEAR CHANGES IN THE LIVER CELLS IN YELLOW FEVER.—Since Torres first described the presence of intranuclear inclusions in hepatic tissue from yellow fever cases, many investigators have reported similar findings. Through the kindness of the Rockefeller Yellow Fever Commission, an opportunity was given to examine the livers of *Macacus rhesus* monkeys experimentally infected with the disease and which had succumbed, small portions of the liver being taken at intervals varying from five minutes to sixteen hours after death. The pieces were fixed in ordinary formalin, cobalt nitrate formalin, Zenker and watery Bouin. Though all the fixatives used gave good results, Bouin was finally adopted as giving the best results.

The stains used were haem. eosin, safranin, neutral red, light-green and Giemsa. The results with Giemsa staining were superior, particularly good differentiation being obtained by staining for twenty-four hours in five *per cent.* Giemsa, decolourising in five *per cent.* (or stronger) tannic acid solution until the sections changed from dark-blue to pink; washing in distilled water and then passing through graduated acetones to xylol. There are two nuclear changes noticeable. The one, a fragmentation or excess formation of chromatin (staining dark-blue with Giemsa), occurs in many conditions where liver cells are involved. The other is the presence of granular material (staining pink with Giemsa)—the “inclusions of Torres”, which are apparently specific to the disease. These changes are present without any diffuse staining of the nuclei such as seen in some necrotic phases. The hyperchromatism varies enormously in the different nuclei; one will show a dark-blue staining blob or mass at either pole; in another, the chromatin material is distributed in the form of small peripherally-arranged granules, the nucleolus occupying the centre. In others again, five or more large granules are arranged radially as in a plasma cell nucleus. Many of the nuclei appear greatly distended. As regards the second change mentioned, the presence of the abnormal intranuclear granular material (acidophilic), it seemingly modifies its arrangement in accordance with the position of

the hyperchromatic granules. It may form a fine ring of closely packed fine granules surrounding a central chromatic fragment or may lie, in appearance like a plasmodial rosette in miniature, in the centre of the affected nucleus. Again, the granules may assume a more linear formation and project like minute crystals from one or more chromatic bodies, or may lie, scattered indiscriminately in between the fragments. In those cells with two or three nuclei, the abnormal substance was usually present in an equal extent in all the nuclei.

Occasionally the material is spread out on each side of a nucleolus in the form of a butterfly—a type noted by Torres to be more frequent in the Brazilian tissues. Frequently cells are seen containing neither nucleus nor chromatin masses, but show a mass of finely granular acidophilic substance centrally situated suggesting that the foreign substance had persisted after the disintegration of the nucleus.

Of the forty monkeys examined, thirty-nine showed the acidophilic intranuclear inclusions whilst in ten normal monkeys, and in six livers from cases of disease other than yellow fever (blackwater fever, obstructive jaundice, relapsing fever, etc.), no such bodies were found.

It would appear that these “inclusions” are useful from a diagnostic standpoint—provided that the tissues are fixed within a reasonable time after death.

RABIES.—During the year five dogs' brains were sent in for examination for Negri bodies. They all came from stations in Southern Nigeria, namely Port Harcourt, Ijebu Ode, Enugu, Ibadan and Lagos and they were all positive.

In the Medical and Sanitary Handbook, full instructions are given reference the removal and transmission of such material and it is worth noting that where these instructions had been followed the brains arrived in excellent condition. The method of sending the head of the dog, is to be discouraged as on arrival, the brain is usually in a state of disfluency.

The method adopted for examination of the brain is the same as that described in the *West African Medical Journal* for October, 1928. By this technique the hippocampal area can readily be removed and sectioned and a diagnosis made within twenty-four hours. As regards staining, Loeffler's methylene blue decolourised with tannic acid has given excellent results, also giemsa.

BLACKWATER FEVER TISSUES.—Post-mortem material from three cases of blackwater fever were received for examination but in only one of these, kindly sent by Dr. McCulloch, Pathologist, Kaduna, were the tissues sufficiently fresh to allow of a careful histological examination to be made. It may be of interest to record the histological findings in this case.

Liver.—Vessels distended, liver cells relatively normal in appearance with the exception of small clusters of necrotic cells scattered throughout the organ. The nuclei of most of the cells stain well, and show clear-cut dark staining nucleoli. Fine acidophilic stippling can be made out in many of the nuclei when stained by Giemsa and is probably a degenerative phase.

The protoplasm of the cells is finely granular like ground glass. Iron-containing pigment is present in the form of various sized granules. A more striking feature is the presence within the protoplasm of dark red-brown or black staining (Giemsa) globules, streaks, and stellate masses—evidently representing the distended intracellular bile-canaliculi.

The larger bile channels appear collapsed. A mild degree of round-cell infiltration is seen in the portal tracts, tending rather to be localised around the bile-ducts.

Kidney.—Vascular congestion. Small areas of round cell infiltration and commencing fibrosis lying immediately subjacent to the capsule.

Glomeruli.—Congestion and round-cell infiltration present. Proliferation of the cells of Bowman's capsule. Pigment granules (biliary) present within the glomerular lumina.

PARENCHYMA.—Tubules dilated and the lining cells are low in type. Their protoplasm is granular and their edges are irregular. Irregular staining of nuclei and many cannot be discriminated from the granular protoplasm.

Bile droplets can be seen within the cells. The tubular contents vary. In the convoluted portions, a fine network of fibrinous material, with scattered collections of coarse acidophilic granules enmeshed therein, is present. The collecting tubules are packed with acidophilic coarse granules similar to the above.

Spleen.—Extensive haemorrhagic areas present. The endothelial lining of the vessels in the trabeculae show proliferation and appear to merge into an overlay of a homogeneously stained (eosin) substance resembling hyaline in appearance. This material encroaches on the lumina of the vessels causing considerable narrowing thereof. Staining with Giemsa demonstrated the affected vessels in a striking manner in that the substance is stained an intense blue-black colour.

Stain for Iron-pigment.—This was positive in the liver and spleen. In the liver the blue-stained pigment seemed most marked peripherally. In the spleen it was scattered diffusely throughout the pulp tissue as finely granular masses.

Stain for fat.—Negative for liver and kidney but present to a very mild degree in the heart muscle fibres.

DIARRHOEA AND DYSENTERY.—In February an investigation was commenced into the causes of these ailments in Lagos.

Through the kindness of the Pathologist, Lagos, all material sent to his laboratory was available for examination and the bacteriological work was done in conjunction with the routine clinical examination.

The original intention was to concentrate at first on amoebic dysentery but *Ent. histolytica* was found to occur at such irregular intervals that the question of preparing media for culture work was abandoned until a more suitable opportunity. On the other hand there was a steady inflow of cases of bacillary dysentery and of cases where neither *Ent. histolytica* nor *Bact. dysenteriae* could be detected.

In 153 cases the stools were plated after macroscopical and microscopical examination. Three McConkey plates were used for each case. A small piece of mucus was selected and spread over the first plate by means of a glass spreader, the same spreader being used for the second plate. The third plate was inoculated from the second by means of a second spreader. This method was found to give a very fair idea of the relative proportions of the intestinal flora.

In seventy-three cases further investigation was abandoned, no colonies being noted which would appear to warrant further work. In a number of cases there was evidence of an upset in the normal proportions of the intestinal flora. In other cases the very normal appearance of the flora suggested malingering.

In eighty cases the investigation was carried further, colonies being fished and tested culturally.

In two cases of Flexner dysentery the organism was recovered post-mortem, in both from the ulcerated intestinal wall, in one from the spleen pulp as well.

The organisms identified were :—

Bact. dysenteriae Flexner	...	...	...	34
Bact. dysenteriae Schmitz	...	...	...	2
Bact. Morgan	...	...	...	8

No cases of Shiga dysentery were found during the period under examination although the organism has been isolated in recent years by Dr. Butler.

Late lactose fermenters were frequent and in view of the work of Dudgeon and Pulvertaft, attention will have to be directed to these organisms as possible causes of repeated attacks of diarrhoea.

One organism isolated in suspicious circumstances is worthy of mention. The patient, a European, reported sick and his stool was available for examination within a few hours of the commencement of the attack. Macroscopically and microscopically the stool was that of a bacillary dysentery. Plating yielded an almost pure growth of the organism in question.

Grown in broth, the organism is a short rod sometimes found in chains. Grown on agar, the organism shows extraordinary pleomorphism even in young cultures. Small coccoid bodies varying in size form the bulk of the culture but large sausage shaped, poorly staining forms are found as well.

Active motility can be seen in broth cultures but several fields may have to be examined before a motile form is found.

The organism is Gram negative, has no fermenting action on carbohydrate media but peptonises milk.

1 cc of a living twenty-four hours old broth culture was injected intraperitoneally into a guinea-pig with no effect.

The patient recovered from his attack within forty-eight hours and no agglutination test appeared to be indicated.

The strain has been preserved.

At first, the only serum available was a stock polyvalent Flexner serum. It was soon found that this had a very limited range in agglutinating the various strains isolated and for the further identification of the Flexner strains, type strains were obtained through the courtesy of the Curator, the National Collection of Type cultures, Lister Institute for the preparation of type sera.

Owing to shortage of rabbits the sera could not be prepared for some considerable time after receipt of the strains. The strains were accordingly subcultured twice daily for a week in nutrient broth before being grown on nutrient agar. The growth was washed off at eighteen hours with .5% phenolised saline and allowed to die out in the ice-chest. Three injections the first consisting of 250 million, the second and third of 500 million organisms each, were made intravenously at intervals of a week. At the end of the third week the rabbits were bled from the ear on three successive days, the sera from the three bleedings being pooled and preserved for use by adding one part of serum to four parts of .625% phenolised saline.

Each of the thirty-four Lagos strains was tested against the five type sera. All strains were passed twice daily through nutrient broth for a few days and then grown on nutrient agar. Emulsions were prepared by washing off the growth with .5% formolised saline and heating at 55°C for half an hour, the emulsions being finally standardised to 500 million organisms per 1 cc.

The range of final dilutions set up was from 1/100 to 1/25600 and agglutination was allowed to go on over night at 55°C, the results being read off at about twenty hours.

The highest dilution showing a trace of granularity seen through a hand lens after quarter of an hour at bench temperature was considered the end point, no notice being taken of any sediment which could be shaken up from the bottom of the tubes.

It was found repeatedly that, in a range of dilutions, precipitation could be observed in the first and second tubes after that tube which was the last to show granularity in the supernatant fluid, the tubes with still higher dilutions and the control tube showing nothing. This may be explained by the possibility that in any one culture, a small percentage of the organisms may have higher intrinsic agglutinating powers than the rest. Another possibility is that there may be group and type agglutinins in the Flexner group, although not so well defined as in the case of the salmonellas. The second alternative cannot be dismissed lightly as it has been observed more than once that an emulsion which gives with one type serum, a clean-cut agglutination (*e.g.* total, standard and nil, or total, subtotal, and trace) will give with another serum a muddy type of agglutination over a range of tubes. As it was evident that, if the last tube showing precipitation were taken as indicating the titre, it would represent the titre of the serum for only a small percentage of the emulsion in question, it was decided to ignore precipitation and consider the appearance of the supernatant fluid only.

To save columns of figures which are difficult to compare, the method of Andrews and Inman in their M.R.C. Special Report No. 42, has been adopted and the results of the serological examination of the thirty-four Lagos strains are set out graphically in the form of spectra, each bar representing the percentage of the titre of a serum for an organism as compared with the titre for the serum's homologous organism.

Of the thirty-four strains, fourteen can be placed in their types at once, strains 46 and 154 belonging to the V type, strains 1, 12, 32, 49, 82, 123 and 131 belonging to the W type and strains 19, 77, 84, 166 and 172 belonging to the Z type.

Seven strains came down to full titre with more than one serum.

Strain 28 agglutinated to 100% with X and Z sera. Absorption of the X serum with strain 28 removed over 90% of its agglutinins for the X organism. Absorption of the Z serum with strain 28 removed only 25% of its agglutinins for the Z organism.

Strain 109 agglutinated to 100% with V and Z sera. Absorption tests did not give such conclusive results as in the case of strain 28, 8.3% of the agglutinins for V remaining in the absorbed V serum and 12.5% of the agglutinins for Z remaining in the absorbed Z serum.

Strains 142 and 144 agglutinated to 100% with the W and Y sera. Absorption tests have not been done.

Strains 87, 107, and 168 proved to be remarkable in that they agglutinated freely with all the type sera, to 100% or over with the V, X, Y and Z sera and to 25-75% with the W serum.

Each type serum was absorbed with strain 168, the titres for the homologous organism after absorption being

V	...	...	...	...	75%
W	...	...	...	...	75%
X	...	...	...	...	25%
Y	...	...	...	...	37.5%
Z	...	...	...	...	75%

Should these strains retain their agglutinating properties after prolonged subculture, they will prove valuable adjuncts to sero-diagnosis.

Extensive agglutinogenesis and absorption tests will be necessary to determine their antigenic composition. In view of the fact that absorption by strain 168 reduces the homologous titre of the X-serum to a greater degree than in the case of the other sera, it will not be out of place to direct attention to the peculiarity of the X-type, described by Andrews and Inman in that whilst the X-type agglutinates very feebly with heterologous sera, it produces a serum which has a wide range for heterologous types.

SPECTRA OF LAGOS FLEXNER STRAINS SHOWING
PERCENTAGE TITRES WITH TYPE SERA.

SHEET I.

50%		100%	50%		100%
Strain 46.			Strain 123.		
V	|||||	100	V	|||||	12.5
W	|||	6.25	W	|||||	100
X	||	3.1	X	|||||	50.0
Y	|||||	9.4	Y	|||||	25.0
Y	|||||	50.0	Z	|||||	16.6
Strain 154.			Strain 131.		
V	|||||	100	V	|||||	12.5
W	|||||	12.5	W	|||||	100
X	|||	6.25	X	|||||	25.0
Y	|||||	25.0	Y	|||||	25.0
Z	|||||	50.0	Z	|||||	16.6
Strain 1.			Strain 19.		
V	|||||	25.0	V	|||||	25
W	|||||	100	W	|	2.1
X	|||	6.25	X	|||||	50.0
Y	|||||	37.5	Y	|||||	18.75
Z	|	1.0	Z	|||||	100
Strain 12.			Strain 77.		
V	|||||	25.0	V	|||	6.25
W	|||||	100	W	|||||	12.5
X	|||||	12.5	X	|||||	12.5
Y	|||||	37.5	Y	|||	8.3
Z	|	1	Z	|||||	150
Strain 32.			Strain 84.		
V	|||||	16.6	V	|||||	9.4
W	|||||	100	W	||	4.7
X	|||	6.25	X	|||||	50
Y	|||||	66.6	Y	|||	8.3
Z	||	3.1	Z	|||||	150
Strain 49.			Strain 166.		
V	|||	6.25	V	|	1.6
W	|||||	100	W	|	1.2
X	|	2.1	X	|||||	33.3
Y	|||||	25	Y	|||||	25
Z	O	0	Z	|||||	100
Strain 82.			Strain 172.		
V	|||||	12.5	V	|	1.2
W	|||||	200	W	|	1.2
X	|||	6.25	X	|||||	33.3
Y	|||||	33.3	Y	|||||	18.8
Z	|	1.2	Z	|||||	100

SHEET II.

	100%	200%	300%	400%
Strain 109.				
V	|||||	|||||		150
W	|||||			18.8
X	|||||			9.4
Y	|||||			4.1
Z	|||||			100
Strain 142.				
V	|||||			12.5
W	|||||	|||||	|||||	300
X	|||||			4.7
Y	|||||	|||||		200
Z	|||||			1.6
Strain 144.				
V	|||||			3.1
W	|||||	|||||		150
X	|||||			33.3
Y	|||||	|||||		200
Z	|||||			6.25
Strain 28.				
V	|||||			33.3
W	|||||			16.6
X	|||||	|||||		133.3
Y	|||||			11.4
Z	|||||	|||||		133.3
Strain 87.				
V	|||||	|||||		200
W	|||||			75
X	|||||	|||||		200
Y	|||||			100
Z	|||||	|||||	|||||	300
Strain 0107.				
V	|||||	|||||		150
W	Omitted.			—
X	|||||	|||||	|||||	400
Y	|||||	|||||		150
Z	|||||	|||||	|||||	400
Strain 0168.				
V	|||||			66.6
W	|||||			25
X	|||||	|||||		133.3
Y	|||||	|||||	|||||	300
Z	|||||			100

SHEET III.

50%

50%

Strain 2.

V	|||||	12.5
W	||	4.2
X	|||||||	25.0
Y	|	1.5
Z	|||	6.3

Strain 41.

V	||||	8.3
W	O	0
X	|||||||	33.3
Y	||	3.1
Z	|||||||	25.0

Strain 47.

V	|||	6.25
W	|	2.3
X	|||||	12.5
Y	|	2.3
Z	||||	9.4

Strain 59.

V	|||	6.25
W	|||||||	25.0
X	|||	8.3
Y	||||	9.4
Z	|||	6.3

Strain 91.

V	|||||	9.4
W	||	4.7
X	|||||||	25.0
Y	||	3.1
Z	|||||||	18.8

Strain 94.

V	|||	6.25
W	|	1.6
X	|||||||	25.0
Y	||	4.1
Z	|||||||	18.8

Strain 97.

V	||	3.1
W	|	1.2
X	|||||||	18.8
Y	||	4.1
Z	||||	12.5

Strain 111.

V	|||	6.25
W	|	2.1
X	|||||||	25.0
Y	||	3.1
Z	|||||||	16.6

Strain 113.

V	||||	9.4
W	|	2.1
X	|||||||	25.0
Y	||	3.1
Z	|||||||	16.6

Strain 117.

V	|||	6.25
W	||	4.2
X	|||||||	25.0
Y	|||	6.25
Z	||||	9.4

Strain 129.

V	||||	9.4
W	||	4.2
X	|||||||	25.0
Y	||	4.8
Z	|||||||	50.0

Strain 133.

V	|||||	12.5
W	||	4.7
X	|||||||	25.0
Y	||||	6.25
Z	|||||||	33.3

Strain 138.

V	|||||	12.5
W	||	4.7
X	|||||||	25.0
Y	|||	6.25
Z	|||||||	25.0

The thirteen remaining strains agglutinated feebly with the type sera. Only one homologous serum was available, *i.e.*, for strain 59. This had been prepared in the middle of the year when it was found that the polyvalent serum then in use was not proving of much value, and serum 59 itself was put aside for the time being owing to its limited range.

Serum 59 was eventually tested against all the poorly agglutinating strains. Of the twelve heterologous strains only one, strain 41, came down to full titre. The type strains had also been put up against the serum. Type V came down to 33.3%, type W to 8.3% while types X, Y and Z came down to 40.0%.

N.B.—This was the only experiment where broth cultures were used in place of emulsions from agar slopes.

Reference to the table of spectra will show that strain 59 agglutinated with the W serum better than with the other type sera, yet serum 59 has less effect on the W organism than on the other type organisms. The phenomenon is not understood.

Small as they are, the spectra of the other twelve strains are remarkably similar and it is difficult to believe that they can be dismissed as poorly agglutinating strains. Seven of the twelve were isolated in quick succession within a week or two of each other.

It is proposed to make this group the commencing point for further work.

In spite of the small number of strains isolated, there is a strong suggestion of a selective element in the morbidity of the types as regards the native African and the European. The twenty-one cases from which strongly agglutinating strains were isolated included eight Europeans, while only one of the poorly agglutinating strains was from a European.

The number of patients' sera available for tests proved disappointing. Seven sera were tested, the titres varying from 1/80 to 1/320 from the 10th to 16th day. It is hoped when the work is recommenced that it will be possible to follow up each case daily, type the causal organism as rapidly as possible and investigate the development of agglutinins for homologous and heterologous strains.

SUMMARY.

(1) A number of organisms are responsible for the diarrhoeas and dysenteries of Lagos, of which *Bact. dysenteriae* Flexner constitutes an important part.

(2) Various types of the Flexner bacillus are found, some agglutinating strongly, and some poorly with type sera.

(3) There is reason to believe that the poorly agglutinating strains form a type of their own.

The following is a list of the strains found in the Lagos cases :—

V Strain	No. 154,	European,	October.
W Strains	No. 1,	„	January.
	„ 12,	African,	February. Died.
	„ 32,	„	April. Died.
	„ 49,	„	May.
	„ 82,	„	June.
	„ 123,	European,	August.
	„ 131,	African,	August.
X Strain	„ 28,	European,	March.
Z Strains	„ 19,	„	„
	„ 84,	„	July.
	„ 166,	„	November.
	„ 172,	African,	December.

VZ Strains No. 46, African, May.
 „ 109, „ August.
 WY Strain „ 142, „ September.
 WXY Strain „ 144, „ „
 ZY Strain „ 77, European, June.
 Polyagglutinating Strains No. 87, Z and X, African, July. Died.
 „ 107, Z and X, African, August.
 „ 168, Z, X and V, African, November.

Lagos type, No. 2, African, February. No. 41, European, April.
 „ 47, African, May. No. 59, African, May. Nos. 91
 and 94, Africans, July.
 Nos. 97, 111, 113, 117, 129, 133, Africans, August, 111
 and 113 died.
 No. 138, African, September.

ADDENDUM.

Through the kindness of Dr. W. M. Scott, Pathological Laboratory of the Ministry of Health, an opportunity was afforded of testing the Flexner strains with absorbed monospecific sera.

A slight rearrangement of the grouping is necessary :—

Strain 28 agglutinates only with a pure X.

Strain 46 should be grouped as a VZ type.

Strain 59 is a W type.

Strain 77 has a slight Y element in addition to its Z element.

Strains 87, 107 and 168 agglutinate with type Z and X, while strain 168 agglutinates in addition with type V. Their wide agglutinative range is probably due to a stray “ group ” antigen.

Apart from strain 59, now classed as a W type, the poorly agglutinating strains are untouched by monospecific sera though all agglutinate with a Flexner serum rich in “ group ” agglutinins.

It should be added that the Y strain used for the preparation of the Y serum in these investigations was the Hiss and Russell strain. This accounts for the Y element in strains 142 and 144.

ENTOMOLOGY.

Four hundred and thirty-six collections of mosquito larvae were received for identification during the periods January to March and October to December, from the Medical Officer of Health, Lagos.

The number of different species was fourteen, namely *Aedes argenteus* in 206 collections, *Culex nebulosus* in 153, *Anopheles gambiae* in 25, *Culex decens* in 14, *Culex thalassius* in 9, *Culex fatigans* in 8, *Culex duttoni* in 3, *Eretmopodites chrysogaster* in 3, and *Culex consimilis*, *Aedes luteocephalus*, *Aedes irritans*, *Aedes longipalpis*, *Aedes occidentalis* and *Lutzia tigripes* in 1 each. Sometimes two or more species occurred in the one collection, namely *Aedes argenteus* and *Culex nebulosus* in 5 collections, *Anopheles gambiae* and *Culex decens*, in 3, *Anopheles gambiae* and *Culex thalassius*, *Aedes argenteus* and *Culex fatigans*, *Aedes occidentalis* and *Lutzia tigripes*, and *Culex fatigans*, *Culex nebulosus* and *Culex duttoni* in one collection each.

The sources or receptacles numbered thirty, as follows :—Banana stump, barrel, borrow-pit, bottle, bowl, bucket, canoe, catch-pit, cocoa-nut shell, cover of typewriter, drain, drum, dustbin, flower-vase, grindstone, gutters, hole in floor, jug, mortar, motor tyre, pan, plate, pool, pot, pump-pit, swamp, tin, treehole, vat and well.

These in their order of apparent attraction were :—Pot, 190; tin, 46; pool, 43; catch-pit, 31; drum, 25; barrel, 24; canoe, 12; drain, 9; pan, 9; well, 7; tyre, 5; bucket, 4; bottle, flower-vase, swamp each 3; bowl, cocoa-nut shell, cover of typewriter, hole in floor, mortar, pump-pit and treehole each in 2, and the remainder in one instance each.

The Entomological Survey of Lagos was continued during 1929.

- Survey 41.*—East side of Prison Road Obalende. Pool in open grass. *Lutzia tigripes* and *Anopheles gambiæ*.
- Survey 42.*—Twenty yards in bush from 41. Shade. Sample taken at roots of tree. Corethrine larvæ.
- Survey 43.*—Ten yards east of 41. *Culex decens*.
- Survey 44.*—From centre of swamp east of Prison Road. Thick bush. *Anopheles gambiæ*.
- Survey 45.*—Onikan Swamp 200 yards south of Roman Catholic College. Open brackish pool. *Anopheles gambiæ*.
- Survey 46.*—Obalende. West of Prison Road. 30 yards south of culvert. Open pool. *Anopheles gambiæ*.
- Survey 47.*—Thirty yards west of 46. Shaded. Heavy vegetation. *Anopheles gambiæ*.
- Survey 48.*—Twenty yards west of 47. Open small puddle. *Culex rima*.
- Survey 49.*—Thirty yards west of 48. Shaded. Pool at root of Mangrove. *Anopheles gambiæ*.
- Survey 50.*—Thirty yards west of 49. Open pool. *Culex decens* and *Culex ager*.
- Survey 51.*—Railway yard swamp Iddo. Shade. *Anopheles gambiæ*.
- Survey 52.*—Obalende from north of road. Open ditch. *Culex consimilis*.
- Survey 53.*—South side of Obalende Road at first culvert. Shaded. Grass and duckweed. *Culex decens*.
- Survey 54.*—Fifty yards east of 53. Grass and duckweed. *Culex grahami*, *Uranotaenia bilineata* v. *fraseri*, *Mimomyia hispida* and *Uranotaenia annulata*.
- Survey 55.*—Fifty yards east of 54. Long grass. *Culex decens* and *Uranotaenia annulata*.
- Survey 56.*—South side of Obalende Road. Ten yards south of second culvert. Grass and duckweed. *Uranotaenia annulata* and *Uranotaenia bilineata* v. *fraseri*.
- Survey 57.*—Twenty yards east of 56. Small pools with duckweed. *Uranotaenia bilineata* v. *fraseri* and *Mimomyia hispida*.
- Survey 58.*—Thirty yards east of 57. Shaded. *Anopheles gambiæ*.
- Survey 59.*—Twenty yards east of 58. At margin of swamp. *Culex decens*.
- Survey 60.*—Ten yards east of 59. Grass and duckweed. *Uranotaenia bilineata* v. *fraseri*, *Culex decens* and *Uranotaenia pallidocephala*.
- Survey 61.*—Thirty yards south east of 60. *Culex ager* and *Uranotaenia pallidocephala*.
- Survey 62.*—Hundred yards south east of 61. Heavy bush. Unfortunately all larvæ were eaten by a fish before the sample arrived.
- Survey 63.*—Ten yards from 62. Bush. *Culex decens* and *Uranotaenia pallidocephala*.
- Survey 64.*—Ten yards from 63. *Anopheles gambiæ*, *Culex decens* and *Uranotaenia bilineata* v. *fraseri*.
- Survey 65.*—Twenty yards south west of 64. Ditch through swamp. *Anopheles gambiæ*.
- Survey 66.*—Twenty yards south west of 65. From ditch. *Culex annulioris* and *Culex ager*.
- Survey 67.*—Ten yards south west of 66. From ditch. *Culex annulioris* and *Culex decens*.

- Survey 68.—Ten yards south west of 67. From ditch. *Culex annulioris*.
- Survey 69.—Ten yards south west of 68. From ditch. *Culex annulioris* and *Culex ager*.
- Survey 70.—Twenty yards south west of 69. Ditch. *Culex annulioris*.
- Survey 71.—Thirty yards south west of 70. *Culex annulioris*, *Culex ager* and *Culex consimilis*.
- Survey 72.—South of Obalende. From ditch. *Anopheles mauritianus* and *Culex quasigelidus*.
- Survey 73.—200 yards south of 72. Drinking pool at edge of swamp. *Anopheles gambiæ*.
- Survey 74.—150 yards south of 73. From small pool at edge of swamp. *Anopheles gambiæ*.
- Survey 75.—150 yards west of Prison Road Obalende. Pools at roots of palm trees. *Culex insignis*.
- Survey 76.—Thirty yards west of 75. *Culex insignis*.
- Survey 77.—100 yards west of Ikoyi Prison. From shaded margin pools. *Culex insignis*.
- Survey 78.—Ten yards north of 77. *Culex insignis*.
- Survey 79.—Ten yards north of 78. *Culex insignis*.
- Survey 80.—Ten yards north of 79. *Culex insignis*.
- Survey 81.—Ten yards north of 80. *Culex insignis*.
- Survey 82.—Swamp in Railway reservation forty yards from culvert. Water lettuce and grass. *Culex decens* and *Lutzia tigripes*.
- Survey 83.—Swamp near Railway reservation. Open puddle. Corethrine larvæ.
- Survey 84.—Twenty yards from 83. Shade. *Anopheles mauritianus* and *Culex decens*.
- Survey 85.—Twenty yards from 84. Shade. *Culex decens*.
- Survey 86.—Swamp north-east of Apapa railway at E.B. reservation. *Culex ager*.
- Survey 87.—Alongside 86. *Culex ager*.
- Survey 88.—Alongside 87. Shaded. Surface weeds. *Ficalbia malfeyti*.
- Survey 89.—Alongside 88. *Culex decens*.
- Survey 90.—Railway reservation swamp open. *Culex decens*.
- Survey 91.—Railway reservation swamp. *Aedes nigricephalus* and *Anopheles umbrosus*.
- Survey 92.—Same as 91. *Lutzia tigripes* and *Culex decens*.
- Survey 93.—Same as 92. *Uranotaenia annulata* and *Culex decens*.
- Survey 94.—Railway reservation swamp water cress. *Ficalbia malfeyti*.
- Survey 95.—Same as 94. *Ficalbia malfeyti*.
- Survey 96.—Same as 95. *Ficalbia malfeyti*.
- Survey 97.—Same as 96. Water lilies. *Ficalbia malfeyti*.
- Survey 98.—S. W. Eleshin village Ikoyi. Pool at swamp margin covered with green slime. *Culex bitaeniorhynchus*.
- Survey 99.—Near Oluwa village Ikoyi. *Culex quasigelidus* and *Anopheles mauritianus*.
- Survey 100.—200 yards from new Ijora village. *Lutzia tigripes*, *Anopheles gambiæ* and *Culex decens*.
- Survey 101.—From pool covered with green fungus, brackish. *Culex thalassius* and *Anopheles gambiæ*.
- Survey 102.—Open pool in reclaimed sand. Brackish. *Culex thalassius*.

From October to December, 1929, mosquitoes collected from houses in Lagos and Ikoyi were sent in by the Medical Officer of Health. They were :—

<i>Anopheles gambiae</i>	...	...	...	17♂	262 ♀.
<i>Culex nebulosus</i>	...	...	...	89♂	103 ♀.
<i>Culex decens</i>	...	...	...	10♂	72 ♀.
<i>Culex rima</i>	...	...	...	10♂	41 ♀.
<i>Anopheles pharoensis</i>	...	...	...		9 ♀.
<i>Anopheles umbrosus</i>	...	...	...		7 ♀.
<i>Taeniorhynchus africanus</i>	...	...	...		7 ♀.
<i>Aedes nigricephalus</i>	...	...	...	1♂	6 ♀.
<i>Aedes irritans</i>	...	...	...		4 ♀.
<i>Culex consimilis</i>	...	...	...		2 ♀.
<i>Lutzia tigripes</i>	...	...	...		2 ♀.
<i>Cyathomyia fusca</i>	...	...	...		1 ♀.
<i>Taeniorhynchus annetti</i>	...	...	...		1 ♀.
<i>Culex duttoni</i>	...	...	...		1 ♀.

These were dissected and the following are the findings :—

Anopheles gambiae.—Eight with a filarial infection.
Two with sporozoits in salivary glands.
Two with oocysts on stomach wall.

Anopheles pharoensis.—One with oocysts on stomach wall.

As the Anophelines infected with filaria were all collected in the same road a special effort was made to trace the source of infection. Through the kindness of the Medical Officer of Health numbered collections were made and the natives in that district were examined but they were all negative.

A series of collections of larvae were sent out during February by Mr. Brown, European Sanitary Inspector. The adults were *Uranotaenia annulata*, *Uranotaenia bilineata* v *fraser*, *Culex decens*, and *Aedes nigricephalus*.

FEEDING EXPERIMENTS.

Some years ago it was found here that if a mosquito was fed on drawn blood or sugar water, the blood or sugar did not go into the stomach but into the ventral diverticulum. At that time nothing further was done, but last year it was desired to feed *Anophelines* on malarial cultures and feeding experiments were made to find out in what way the mosquito could be induced to take the food presented direct into its stomach.

1st Experiment.—Newly hatched *Aedes argenteus* ♀ put into a tube—the cotton wool plug soaked in sugar water. Dissected immediately after feeding. Diverticulum much distended but no sugar in stomach.

2nd Experiment.—To find out if males acted in the same way a ♂ *Culex nebulosus* put into a tube with net over it and a piece of banana outside the net. Left all night and dissected next day—stomach only with food.

3rd Experiment.—*Taeniorhynchus africanus* ♀ newly hatched put into tube with net and a piece of banana outside, left over night and dissected next day. Stomach full of food.

4th Experiment.—*Taeniorhynchus africanus* ♀ newly hatched put in tube plunged with cotton wool dipped in sugar water—left two days. Stomach full of sugar water, some also in the diverticulum.

5th Experiment.—Newly hatched *Aedes apicoannulatus* ♀ put into tube which was covered with fine chicken skin. Tube lowered into dish containing sugar and blood—the dish resting on a hot plate to keep temperature constant. Killed immediately after feeding. Stomach full of blood and the ventral diverticulum fully distended with blood. The same method was tried with *Aedes argenteus* but the skin was punctured with a No. 1 Entomological pin. On dissection after feeding, the stomach had blood in it though not fully distended, but the diverticulum had no blood.

6th Experiment.—A tube with *An. gambiae* ♀ was covered by a large green leaf, perforated by a No. 1 pin and lowered into sugar and blood. The mosquito fed immediately and both stomach and diverticulum were full.

7th Experiment.—*Culex nebulosus* ♀ in tube covered with a piece of waxed cotton, blood and sugar put on outside of cotton. Mosquito killed and dissected immediately after feeding. Stomach full of blood, a small drop at the base of the ventral diverticulum. Another *Culex nebulosus* ♀ fed through cotton with wax round only the rim. On dissection its stomach showed a little blood, but the diverticulum was full.

Two *Culex nebulosus* ♀ ♀ fed in the same way and kept one day, both showed a small amount of blood in the stomach and a trace in the diverticulum.

8th Experiment.—Fresh rat skinned and the leg skin shaved a little and filled with blood. Suspended in a test tube with newly hatched *Aedes africanus* and *Eretmopodites chrysogaster* ♀ ♀. One *Aedes* seemed very eager to feed but after being left all day and then dissected, it was found that none of them had fed. As none of these methods were found satisfactory, other experiments are still being tried.

In January Mr. Brown, European Sanitary Inspector, experimented with Paris Green on a swamp. He began on the 8th January and treated it periodically until the middle of February. Samples were taken and sent out for examination very frequently.

			Culicines.	Anophelines.
On 10th January	...		no larvae	—
14th	„	...	17	1
17th	„	...	70	3
19th	„	...	31	1
21st	„	...	50	5
24th	„	...	30	—
26th	„	...	20	—
28th	„	...	48	—
31st	„	...	2	—
2nd February	...		2	2
4th	„	...	1st instar	3rd instar
			3	4
		2nd „	2	—
		3rd „	1	—
		Fully grown	7	—
		Pupa	1	—
7th	„	...	1st instar	1st instar
			6	9
		2nd „	1	2nd „
			2	9
		Fully grown	2	3rd „
			1	1
		Pupa	1	—

			Culicines.	Anophelines.
9th February ...	Fully grown	2	2nd instar	7
			3rd „	5
			Fully grown	3
11th „ ...	1st instar	3	1st instar	12
	2nd „	2	2nd „	3
	3rd „	5	3rd „	5
	Fully grown	3		—
	Pupæ	2		—
14th „ ...	1st instar	5	1st instar	3
	2nd „	1		—
	Pupæ	2		—
16th „ ...	3rd instar	1	3rd instar	2
	Fully developed	3		—
18th „ ...	3rd instar	2		—
	Fully grown	2		—
21st „ ...	Fully grown	3		—

During the year over 7,000 fleas were examined and identified.

BLACKWATER FEVER.

Reports on ten cases of this disease have been received. The months in which they occurred were January two, February four, October two, and December two.

Four cases were reported from the Northern Provinces, three from Zaria and one from Kaduna. Five cases occurred in the Southern Provinces, one at each of the following stations, Abeokuta, Benin, Ibadan, Lagos and Port Harcourt and there was one case in British Cameroons, at Victoria.

There was one female, the remaining nine being male. All were adults, the respective ages being 20, 22, 26, 27, 31, 32, 38, 39, 40 and 43 years.

By occupation, there were two traders, one timber supervisor, one ship's cook, one clerk and one housewife among the non officials, and of officials there was one administrative officer of the Public Works, a foreman of works, a locomotive driver and a lieutenant of infantry.

As regards nationality all were of British birth with the exception of one Greek, one Syrian and one negro.

The mortality was high, there being five deaths. Death was due to suppression of urine in three cases and to syncope in two. The present attack was the first, except in two cases, that of the negro in which it was the second attack and that of the Syrian in which it was also the second attack. The former recovered, the latter died. A short account of each case is given, from which it will be seen that in two cases quinine was certainly not in any way connected with the onset of the hæmoglobinuria.

In case (2) five grains of quinine were taken one week before the onset and in case (5) no quinine had been taken for two weeks prior to the onset. In case (4) the dosage of quinine was minute, in view of the previous history.

The blood was examined in every case except case (6) in which the patient was not seen until the fourth day of illness.

Subtertian parasites were present in case (1) (this case is more fully reported in the *West African Medical Journal* Vol. 3 No. 2 pages 32 and 33), in case (3) on the day before hæmoglobinuria, in case (4) on the first day of hæmoglobinuria, in case (7) two days before the recurrence of hæmoglobinuria and in case (8) on the first day of hæmoglobinuria. In cases (2) and (9) pigmented mononuclear leucocytes were present on the first day of hæmoglobinuria, but parasites were not seen. Neither parasites nor pigment were seen on the first day of hæmoglobinuria in

cases (5) and (10). Differential leucocyte counts were done in all save cases (4), (6) and (10) but with the exception of case (1) they did not differ from the usual findings.

Case 1.—Male, age 38. English, Ship's cook. Sixteen years on ships. Sailing between England and West Africa. Admitted having had an attack of malaria eight years previously. Only took quinine when ill. Present voyage six weeks old, with four ports in Nigeria visited. Had been "off colour" with headaches three weeks before. Illness began on 22nd January with temperature of 103°F. , persistent vomiting and sleeplessness. Given ten grains quinine by Chief Steward on 22nd and again on 23rd January while at sea. Seen by Medical Officer at Port Harcourt on 24th, temperature 102.4°F. , jaundiced, dull and apathetic, and with subtertian parasites in blood. Given intramuscular injection of 10 grains quinine bihydrochloride and two hours later the urine which was passed was black. By the following evening the urine was clear and the temperature normal. On 28th January, a course of quinine was begun starting with two and a half grains twice daily by the mouth, raised next day to five grains twice daily. Recovery rapid. In this case it is presumed that the patient had been passing black water before admission to hospital.

Case 2.—Male, age 32. Greek, trader. Had first come to Nigeria some six years previously and had been resident in Ibadan for one year. He had attacks of fever from time to time and took quinine only on these occasions. On 19th January had a "dose" of fever and took a five-grain tabloid of quinine. On the afternoon of 26th January, in the damp cold after a tornado he felt chilly and passed black water. The temperature remained round about 102°F. for two days, then hovered about 100°F. The urine, clearing slightly diminished in quantity until the end of the fourth day. On the 5th day no urine was passed and death occurred on that night.

Case 3.—Male, age 40. English. Foreman of Works. Had first come to Nigeria in 1920. Had been previously in India for seven years. Resident at Dumba, near Zaria for ten months and had had a number of attacks of malaria. Usually took five grains quinine daily but had taken none for seven days previous to admission to hospital on 30th January, during which period he suffered from fever and vomiting. On admission the temperature was just under 100°F. and subtertian parasites were present in the blood. He was put on five grains quinine four-hourly on 31st January, and took twenty grains in all, that day. On 1st February at 10 a.m., and again at noon he was given ten grains of quinine; he passed black water at 3.30 p.m. after a rigor lasting half-an-hour, the temperature rising suddenly to 103°F. and falling as suddenly to normal, round about which it remained. The urine cleared on the third day, but only small amounts were passed, from three to eight ounces per day until the thirteenth day, when a fatal attack of cardiac syncope occurred.

Case 4.—Male, age 26. Sierra Leonean. Bank clerk. Had been in Nigeria since early boyhood. Had a previous attack of blackwater fever in August, 1927, which lasted three days and was mild in character. Since then he had taken no quinine. On 18th February, he consulted a Medical Officer, complaining of fever and weakness of several days' duration. Subtertian malarial parasites were found in the blood and he was given 1.2 grains quinine the same evening. Next morning he was given a similar amount and a few hours later he passed black water. The temperature was 102.6°F. and he felt weak. The hæmoglobinuria lasted one day, the temperature became normal at the end of the second day and recovery was rapid. Previous to his first attack of blackwater fever, he had on occasions taken five grains of quinine without untoward effects.

Case 5.—Male, age 31. English. Lieut., R.W.A.F.F. First came to Nigeria in 1925. Served eighteen months, proceeded on leave and had served fifteen months at Kano when present attack occurred. For the previous fortnight he had been on manoeuvres in the "bush" near Zaria and had taken no quinine. Although he had had a number of

attacks of malaria he did not take quinine regularly. There were apparently no premonitory signs. He woke at about midnight of 20th February, vomited and passed urine which was dark-red, after which he returned to bed and slept. He was admitted to hospital in the morning of 21st February, the temperature on that day and for the next two days varying between 101° and 103°F . The urine cleared slightly, eighty to ninety ounces were passed daily, but he died on the fifth day.

Case 6.—Male, age 22. Scottish. Timber supervisor. First visit to tropics. Had been in Nigeria thirteen months during which time he had “ fever on and off ”. He was careless in his habits, irregular with quinine and had holes in his mosquito curtain. He lived at Nikrowa, Benin district in a damp swampy forest area. He had had malaise, vomiting and fever for three days, during which he did not see a Medical Officer but dosed himself with twenty grains quinine each day. Black water appeared on 24th February and he continued to take five grains quinine daily until calling in a Medical Officer on 28th February. He was very ill and collapsed then, but the urine had cleared and he made a slow but complete recovery.

Case 7.—Male, age 43. English. Public Works. Fifteen years in West Africa; seven on Gold Coast, eight in Nigeria. Has had frequent attacks of “ biliousness with fever ”, and took five grains quinine daily except during these attacks, but after each attack he took ten grains daily for a few days. During his present tour of five months has had many such attacks, and had three during the three weeks preceding present illness. On 2nd October had “ bilious attack ” and on 3rd and 4th October took ten grains quinine hydrochloride at 8 p.m. Felt shivery and seedy during night of 4th and at 6.45 a.m. on 5th, passed reddish urine. He was at once removed to hospital, where his temperature was found to be 100°C . A specimen of urine passed at 9 a.m. contained methæmoglobin but subsequent specimens were clear and the temperature was normal by evening. Thereafter the patient appeared comfortable and well until 12th October, when the temperature rose to 100°C . On 13th October the temperature reached 101° and blood examination revealed the presence of subtertian parasites. He was given one grain quinine by mouth on 12th October, five grains on 13th, and five grains twice on 14th October. On 15th October, at 10 a.m., he was given six grains quinine bihydrochloride intramuscularly. At 5.20 p.m., the urine passed was the colour of port wine, the temperature later shooting up to 104.2°C . Thereafter the urine became very scanty, did not clear, the temperature remained febrile and he died on 22nd October.

Case 8.—Female, age 27. Scottish. Wife of African. Arrived in Nigeria, August, 1928, and lived in Abeokuta until present illness in October, 1929. She used a mosquito-curtain and mosquito boots but took quinine only when feeling seedy. During the last two months had considerable “ low fever ”. After a fortnight’s abstinence from quinine she felt off colour and took five grains quinine hydrochloride on evening of 7th October. The dose was repeated at 9 a.m. on 8th October after a night of shivering, and at 2 p.m. black water was passed. The temperature remained round about 101°C . for four days, the hæmoglobinuria disappeared in three days but the convalescence was slow.

Case 9.—Male, age 20. Syrian. Trader. Born in Nigeria. Traded mostly in Calabar and in Victoria. Had a previous attack of blackwater fever (date not stated) of a mild character. Malarial attacks were frequent and quinine was only taken during these. Felt seedy on 21st December and took five grains quinine at noon and again at 6 p.m. At 7, next morning, passed black water. The urine cleared on the third day but was passed in very small quantities, from one ounce to nine ounces. No urine was passed after noon on the 4th day and he died in the evening of the 5th day.

Case 10.—Male, age 39. English. Engine driver. Had been three years in Nigeria, his present tour having lasted five months. There was no history of malaria, and he was irregular in quinine prophylaxis. He felt out of sorts on 23rd December, and took fifteen grains quinine at

2 p.m. At 10.30 p.m., he passed dark urine, following a rigor an hour previously. The temperature was 101°F. on 24th December, but fell to normal in the evening and remained so. The urine cleared on 25th December. The illness was comparatively mild except for severe anaemia and recovery was uneventful.

NEOPLASMS.

Through the kindness of members of the Staff, and private practitioners, seventy-six specimens of tumour tissue have been received for examination.

In the majority of cases they were accompanied by good clinical notes though it is still necessary to stress the importance of these when sending in tissues, and also to urge the need for correct preservation according to the instructions contained in the Medical and Sanitary Handbook (1928), page 71, paragraph A.

The following analysis amply demonstrates the great variety and wide distribution of the specimens examined and, small though the numbers be, serves to attract attention to the protean manifestations of neoplastic disease among the natives of Nigeria.

Benign or simple tumours. A total of twenty-eight examined.

Adamantinoma	of lower jaw	...	...	2
Adenoma	of female breast	...	...	2
Cystadenoma	of orbit	...	...	1
"	of thyroid	...	...	1
Epulis	of lower jaw	...	...	1
Fibroma	of forehead	...	...	1
"	of finger	...	...	1
"	of jaw	...	...	1
"	of scapular region	...	...	1
"	of thigh	...	...	1
"	of uterus and ovary	...	...	1
Fibro-myoma	of uterus	...	...	1
Hæmangioma	of spleen	...	...	1
"	of ?	...	...	1
Lipoma	of thigh	...	...	1
Neurofibromatosis (von Recklinghausen's disease)				1
Osteoma	of tibia	...	...	1
Papilloma	of larynx	...	...	1
"	of scalp	...	...	1
"	of axilla	...	...	1
Polypus	of rectum with associated schistosomiasis	...	...	1
"	of rectum (cyst-adenomatous type)	...	...	1
"	of uterus	...	...	1
Simple cyst	of salivary gland	...	...	1
"	of temple	...	...	1
Simple myeloid tumour (benign giant-cell sarcoma)	of femur	...	...	1

The benign tumours with one or two exceptions do not present any features of particular interest. All occurred in native Africans with the exception of a simple papilloma of the axilla which was obtained from a European. Polypi, though strictly local hyperplasia of tissue, are included amongst the simple tumours. Adamantinoma should, perhaps, receive mention as being a comparatively rare tumour with a tendency to local recurrence and invasion of neighbouring structures. The cystic type is more common in the lower jaw whilst the more solid and more malignant type usually springs from the upper jaw. These tumours are said to be derived from paradental epithelial debris or from the enamel organ and Ewing (1) states that they may, in successive recurrences, change from an adult acanthoma through an adenomatoid growth to a

highly malignant tumour composed of closely packed, indifferent round and polyhedral cells. Adamantinoma appears to be met with fairly frequently in Nigeria.

MIXED TUMOURS.

Mixed tumour of parotid gland ...	...	...	5.
Mixed tumour of neck ...	...	...	1.

These tumours, common among the natives of the country, do not fall easily into either the benign or malignant group but should be regarded as potentially malignant. Of the six specimens received, one, from the parotid gland, showed definite carcinomatous change. It is not certain that the mixed tumour of the neck mentioned above was not also of parotid origin.

Malignant Tumours.—Total of forty-two examined.

1. Carcinomata.

Squamous carcinoma				
(epithelioma)	of scrotum	...	...	1
"	of heel	...	...	1
"	of cervi uteri	...	...	1
"	of neck	...	...	1
Adeno-carcinoma	of parotid gland	...	...	1
"	of liver	...	...	4 (one biliary in origin.)
"	of female breast	...	...	2
"	secondary in a gland	...	...	1
"	of ?	...	...	1
Myxo-ado-carcinoma	of anterior triangle of neck	...	...	1
"	of palate	...	...	1
Solid or diffuse				
carcinoma	of orbit	...	...	1
"	of bladder	...	...	1
"	of female breast	...	...	2
"	of liver	...	...	1
"	secondary in abdominal gland	...	...	1
"	cervi uteri	...	...	1
Pre-cancerous condition	in chronic mastitis	...	...	1

2. Endotheliomata.

Angio-endothelioma	of skin	...	...	1
"	of erector spinæ muscle	...	...	1
Cylindroma	of orbit	...	...	1
Endothelioma	of gland	...	...	1

3. Sarcomata.

Round-cell sarcoma	of neck	...	...	1
"	of abdomen	...	...	1
"	of male breast	...	...	1
"	of gall-bladder	...	...	1
"	of scalp	...	...	1
"	of orbit	...	...	1
Spindle-cell sarcoma	of arm	...	...	1
"	of tibia	...	...	1
"	of abdomen	...	...	1
Lymphosarcoma	of axilla	...	...	1
"	of neck	...	...	2
Gliosarcoma	of orbit	...	...	1

4. Melanomata (melanotic sarcoma.)

Melanoma	of groin	...	...	1
"	of skin (region not specified)	...	...	1

Of the malignant tumours in the above analysis all, save two, occurred in native Africans. The squamous carcinoma of the neck and the pre-cancerous changes in a chronic mastitis were from Europeans. Ewing (2) stresses the importance of the latter condition as regards the

treatment to be adopted in cases of chronic cystic mastitis. The necessity for a biopsy and careful histological examination must be emphasised.

MALIGNANT DISEASE IN THE NATIVE POPULATION.

The study of malignant disease among so-called primitive races is an absorbing one and is as yet in its infancy. This country with a population of some nineteen millions cannot fail to provide an excellent field for such work and it is to be hoped that cancer research will not be neglected here.

The present state of development of Nigeria is not such as to permit of reliable statistics regarding the incidence of malignant disease among the indigenous population, though with the general opening up of the country, the building of hospitals and dispensaries, the increase of medical staff, and above all, the growth of confidence of the native in Western methods, this state of affairs will rapidly change.

The long cherished theory of a low cancer incidence in primitive races by reason of their more simple diet and natural mode of living would appear to be very wide of the true state of affairs.

Dietetic research is likely to prove that the food of the native, though simple, is in many cases unsuitable, and, as for his mode of living, it may indeed be natural but it is certainly far from conducive to health in the majority of primitive communities.

One cannot in this short discussion presume to give a detailed account of the various manifestations of malignant disease which appear in the above analysis of specimens received during the year, nor would it serve any useful purpose to do so here.

Attention may, however, be drawn to certain salient and interesting points which are brought out by the analysis.

- (1) The great variety of malignant neoplasms represented in such a small number of specimens.
- (2) The high percentage of diffuse carcinomata, *i.e.*, tumours of a very malignant character.
- (3) The relatively large number of liver cancers, representing 11.9% of the total malignant tumours.

The subject of liver cancer among the natives of this country has received some attention in previous Annual Medical and Sanitary Reports. Ramsay (3) (1928) suggests that valuable and interesting results may be obtained by a pathologist and bio-chemist working in collaboration.

The relation of these tumours to cirrhotic changes in the liver is a remarkably constant one.

The occurrence of malignant disease in children and adolescents also merits some attention, and one is led to believe, by a study of the records of this institute over a period of some years, that the incidence is unusually high in this country.

A plea may here be put forward not to omit mention of the age of the patient when sending in specimens of tumour tissue for examination.

Of the malignant tumours recorded in the above analysis the following were mentioned in the accompanying clinical notes as having occurred in children :—

- | | | | | |
|---|-----------|-----|----|--------|
| (1) Adeno-carcinoma of parotid. | Child aet | ... | 15 | years. |
| (2) Round-cell sarcoma of abdomen. | Child aet | | 6 | " |
| (3) Adeno-carcinoma of liver (biliary). | Child aet | | 6 | " |
| (4) Round cell sarcoma of orbit. | Child aet | ... | 8 | " |

REFERENCES.

- (1) Ewing Neoplastic Diseases, 2nd edition, page 47.
- (2) Ewing Neoplastic Diseases, 2nd edition, page 489 *et seq.*
- (3) Ramsay, G. W. St. C., Medical and Sanitary Report, Nigeria, 1928, page 70.

APPENDIX B

REPORT OF TSETSE INVESTIGATION, 1929.

BY

H. M. O. LESTER, M.R.C.S., L.R.C.P.

Tsetse Investigator.

30th December, 1929.

ANNUAL REPORT—TSETSE INVESTIGATION, 1929.

SIR,

I have the honour to submit to you my report for the year 1929.

Dr. Ll.Lloyd directed the work of the Investigation until November, when he retired to take up an appointment in England.

Dr. H. M. O. Lester was on leave, June to November, and took charge after Dr. Lloyd.

Dr. P. H. Rawson was on duty until March when he proceeded on leave. On his return he resumed his substantive duties.

Mr. A. W. Taylor returned from leave in March.

Dr. R. D. Mackenzie, Immunologist and Mr. R. S. Marshall, Veterinary Pathologist, have now joined the Investigation and it is hoped that the research team will be completed by the appointment of a Bio-chemist.

The complement of Sleeping Sickness Officers has been maintained throughout the year. Dr. J. C. Paisley proceeded on leave in December. Dr. G. G. Brander was absent on leave from February to August. Dr. F. Kane went on leave in August and was relieved by Dr. H. C. E. Chantler. Dr. C. W. Hope-Gill proceeded on leave in October and was relieved by Dr. J. H. Pasqual.

The Administrative officers seconded to the Tsetse Investigation have done useful work in supervising clearings throughout the country. Captain W. J. Warren was in charge till October. Mr. P. F. Brandt and Mr. R. D. D. Birdwood were attached until April. As the settlement of areas cleared upon a large scale has lagged behind the clearing, a large amount of this experimental work is to be dropped for some years. Protective clearings are to be supervised by the Sleeping Sickness Officers under the advice of the Forestry officer seconded to the Investigation. In the circumstances there will no longer be the need for the services of specially seconded Administrative officers.

Captain A. S. Thornehill, Assistant Conservator of Forests, was attached until May when he resumed his substantive duties. He returned to the Investigation in November and has rendered valuable assistance with work on clearing and regrowth.

In June, the Tsetse Investigation moved from Sherifuri to its new quarters at Gadau. The new laboratory buildings are now complete except for the installation of the electrical equipment, refrigerators and water supply. Already the conditions for work are a great improvement on those of the old camp, though the real benefit of the change will not be felt till the electrical and water power can be utilised.

Mr. J. Kirkham, Electrician Mechanic, who assumed duty in October, is working on the installation of plant.

Summaries are given of the following papers of a technical nature which are being prepared for publication—"Some factors influencing the Trypanosome Infection Rate in Tsetse Flies" by Dr. Ll.Lloyd, "The Adhesion Test Applied to Cattle" by Dr. H. M. O. Lester and "The Mechanical Transmission of West African Strains of *T. Brucei* and *T. gambiense* by Glossinae and other biting Flies" by Mr. A. W. Taylor, and "The Blood Chloride in Sleeping Sickness with a note on the Prognosis" by Dr. F. Kane.

H. M. O. LESTER,

Tsetse Investigator.

THE HONOURABLE

THE DIRECTOR OF MEDICAL AND SANITARY SERVICE,
LAGOS.

CLEARING EXPERIMENTS.

The clearing experiment at Sherifuri described in the Annual Medical and Sanitary Reports of 1927 and 1928, was continued during the dry season of 1928-29 under the general supervision of Captain W. J. Warren, Assistant District Officer. The supply of voluntary labourers was great and more than could be employed constantly applied for work. These were all local people who in 1922 when the Tsetse Investigation started work at Sherifuri would not come willingly for labour.

METHOD OF CLEARING.

The total area dealt with comprises approximately seventy-two square miles of country and about sixty miles of the meandering water courses have had the thicket and fringing bush cleared from their banks. In general, the policy of not cutting the savannah woodland has been adhered to but in certain parts the heavier patches of this have been cleared to afford contrast with similar areas conserved, especially as regards the invasion of the clearings by *G. morsitans*. One particular piece of very heavy forest with much thicket was specially dealt with by Captain Thornewill, Assistant Conservator of Forests, who preserved a large number of the finer clean trunked trees so as to avoid devastation and attempt to lead the area over into good savannah woodland. It will be some time before the result of this is seen but in general it has been feared that where the slash lies very heavily the subsequent fire will be so severe that high trees left will be irrecoverably damaged. This area was recently inspected, and where heavy slash lay, the conserved trees have suffered severely from fire damage. Where, however, slash was less heavy, or it had been possible to remove it a short distance, fire-damage has been negligible, consisting of slight sub-crown scorching. Taking the area as a whole there is a distinct tendency towards grass invasion and preservation of the amenities of the locality.

Captian Thornewill also attempted another type of clearing in fringing bush which, if successful, would materially reduce costs. In this case the thicket and lower branches of the trees were cut but the thicket supporting trees were only "sapped", that is they were encircled with a ring of overlapping slashes, the lower edge of each cut being turned outwards by a twist of the axe at the end of the blow. Here again it is necessary to wait some time before a final verdict is pronounced as the thicket may be able to recover by clambering up the sapped trees before these die, a period of several years in some cases. Recent inspection of this area indicates the probability of excellent results. Trees weakened by sapping have nearly all succumbed to fire. The present clambering growth is herbaceous and has a general tendency to smother any surviving aboreal regrowth. Regrowth from woody climbers is very little, and the good results on both these and the thicket trees may be attributed to the fact that not only was the slash to a certain extent stacked but was also spread back from the bank into the neighbouring grass and savannah. The immediate effect on tsetse was equal to that of complete clearing with the exception that one of the most prevalent and troublesome riverine trees, the giyeya (*Mitragyne africana*), is so deeply creviced that it is not susceptible to sapping in many cases. In the shade of these *G. tachinoides* lingered and it seems that this tree must always be felled in anti-tsetse clearing.

THE EFFECT ON TSETSE.

In the 1928 report it was shown that with *G. tachinoides*, when a clearing was extended to only 300 yards, the number of flies invading the clearing during the wet season spread was very much reduced and when the clearing was extended to 800 yards the invaders became almost negligible. This has been confirmed but it is also found that if a suitable area of thicket of a secondary focus is left in a clearing which may extend for a distance of 3,000 yards, the wandering wet season flies are sufficient to repopulate it fully.

It was also shown that the number of *G. morsitans* invading the good savannah woodland left in the general clearings during the wet season spread was not reduced from normal (seventy per boy-hour approximately) when a clearing of the neighbouring primary focus was extended to 800 yards but that when the clearing was extended to 2,500 yards there was material reduction; thus in two cases the reduction was from sixty-eight per boy-hour to sixteen: and from seventy-seven per boy-hour to twenty-seven respectively. The extension of the clearings to 7,000 yards did not produce a corresponding benefit since the wet season spread of 1929 brought densities of ten flies per boy-hour into these areas of savannah, *G. morsitans* thus spreads at least four miles from its primary foci in the wet season.

A factor which may have played a considerable part in this failure to control *G. morsitans* in proportion with the extension of the clearing is the fact that antelope and pig have increased in numbers considerably in the cleared area as though finding more respite from the attacks of tsetse than in the neighbouring uncleared parts. Lions also seem to have increased in numbers and during 1929 have been repeatedly seen abroad in full daylight though previously they were rarely seen. This also may be attributable to freedom from fly worry.

If the clearings were being taken up for farming their extension in this area would be justified as this by driving off the game would open up the fertile parts for cattle but settlers seem still afraid and have come only in small numbers. The area will therefore not be extended further, but it proposed to maintain the clearing accomplished by occasional reslashing as native confidence may at any time be gained.

THE MATYORO CLEARINGS.

The other main clearing experiment around the Matyoro lakes in Gombe Division is more prosperous, as three considerable groups of settlers have farmed there and permanent houses have been built in what was one of the most feared parts of the north. This clearing extends for about six and a half miles in a straight line and there are no complicating side streams as in the Sherifuri area, the country for many miles north and south being waterless. The chief anxiety here is in the regrowth of the palustrine fig trees which are regenerating from broken twigs and even chips of bark. The fact that in the largest of the lakes, an open sheet of water which has been formed in recent times, there is no standing vegetation but dead trunks still stick up here and there, shows that the problem should be solved by flooding the marshes to a depth of a few additional feet. A dam of timber and rock was therefore made in February, 1929, across a narrow gorge which carries the channel in the middle of the valley. This dam is thirty feet long and ten feet deep and about sixteen feet in width and is calculated to flood the western half of the clearing and a considerable area of uncleared valley beyond this as the valley floor is almost flat. If the dam is successful it will raise the margin of the water above the region of the hygrophilous vegetation to land which is almost thicket-free. The place was visited by Captain Warren during the floods who reported the main dam to be intact but that two shallower dams in other places calculated to hold back the water had both been breached. It will be visited again shortly and if the dam is not achieving its purpose, a concrete structure will be built to replace it.

DEFERRED BURNING.

A portion of the cleared area at Sherifuri, about twenty-one square miles in extent was protected from the early grass fires by means of two broad fire traces. The grass was fired in the late dry season at the end of February and over most of the area the fires were thorough but on the river plains the burning was erratic as patches of the grass were still

green. Through the conserved portions of the savannah woodland the fires passed well, consuming all the grass and it certainly reduced the number of *G. morsitans* then present. Thus in the savannah forest backing the eastern pond the February density of fourteen per boy-hour was reduced to nine after the fire and near the Round Pond sixteen per boy-hour was reduced to four. Behind the River Pond where the savannah had been much thinned a density of three morsitans per boy-hour was reduced to one. *G. tachinoides* was too scarce in the clearings at this time for any figures to be given. It is not proposed to carry out any further experiments in delayed grass burning in Nigeria as four years' experience has shown that under local conditions the results obtained do not justify the expense and difficulties which the fire protection involves.

In addition to his advisory and control work in the Sherifuri and Matyoro areas, Captain Thornehill also carried out similar duties in the neighbourhood of Kaduna and Zaria and in the Mama District of the Akwanga Division.

SOME FACTORS INFLUENCING THE TRYPANOSOME INFECTION RATE IN TSETSE FLIES.

The following is a brief account of a study in transmissibility of two old established laboratory strains of *T. brucei*.

T. brucei Strain G. obtained from wild *G. morsitans* was 377 days old at the beginning of the experiment. It had passed through a long series of rats and had become so virulent to white rats that their average life was only six days.

T. brucei Strain D. also obtained from wild *G. morsitans* was 135 days old and passed through a series of dogs. It was less virulent to white rats, their average life being seventeen days.

TECHNIQUE.

Laboratory bred *G. tachinoides* were kept in small kidney shaped cages made to fit the bellies of the guinea pigs used in the transmission. As the mean temperature of the laboratory was rather low, in some instances the flies were kept in an incubator at 85-95°F. for the first few days after their infecting feed. They were given 3-6 feeds on the infected animal after which they were fed on a clean guinea pig. They were dissected after intervals of 11-24 days from their first infecting meal.

The infections encountered are classified as (a) light in the gut and likely to die out, (b) heavy in the gut and likely to mature, and (c) mature with salivary glands infected.

TRANSMISSIONS.

Strain D.—149 flies in five groups were employed. There were no mature infections but one very light gut infection was found on the 19th day.

Strain C.—206 flies in seven groups were employed. All the groups gave negative results except the last in which there were three infections, one mature and two heavy in the gut.

Strain C. + D.—Flies in these series were fed on alternate days on the two strains, generally three days on each, to see if mixing the two strains would effect the infection rate. 277 flies in eight groups were employed with results which are given in the table.

TABLE.—DETAILS OF ATTEMPTED TRANSMISSION OF
T. Brucei STRAINS C AND D MIXED IN FLY,
 BY *G. Tachinoides*.

Series	1	2	3	4	5	6	7	8
No. of flies	21	52	70	15	23	31	40	25
Day of dissection ...	12-14th	20th	19-20th	16th	19th	20th	12th	17th
Infections found.								
(a) Light in gut ...	1	0	0	1	0	0	2	0
(b) Heavy in gut	1	0	1	5	0	0	0	0
(c) Mature in sali- vary glands	3	3	0	7	0	0	0	2
Result of clean animal	Inf.	Inf.	...	Inf.	...	...	...	Inf.
Temperatures.								
(a) Incubator ...	...	...	...	95 for 8 days	85-92	...	95	95 for 7 days
(b) Laboratory ...	90.1	78.9	77.8	81.2	...	80.6	...	79.4

Series 4 was the most interesting as among fifteen surviving flies there were found seven mature infections, five heavy gut infections and one very light one, only two flies being negative. This is believed to be the heaviest rate of infection recorded with any of the *T. brucei* group of trypanosomes.

Strain C.D.—This strain was the product of series 1 of the mixed strains and there is no certainty that it is not either just plain C or D. It had one point of interest in that it was very much more pathogenic to white rats than a strain freshly isolated from the fly usually is. Three attempts to transmit this strain were made, 129 flies being used. One mature and two heavy gut infections were found.

In the course of these experiments some unusual forms of flagellates were met in the mid gut of the fly.

They consist of :—

- (1) A long whip-like crithidial form, certainly Kleine's "male form", which Miss Robertson (1913) found to be rare and considered to be degenerate. In some of these preparations it was abundant.
- (2) The same form dividing by throwing off from the posterior end a tiny slender crithidial form, which at division has its flagellum sticking out at a right angle to the body.
- (3) The tiny crithidial form lying free.

It happened that these forms were found only among the preparations made from flies in which the two strains had been mixed, but many more of these were available for examination than from the single strains. Its significance, if it had any, is not understood.

DISCUSSION.

In these transmission experiments 355 flies which had fed on a single strain gave one mature and three heavy gut infections, a total of 1.1% while 277 flies fed on both strains gave fifteen mature and seven heavy immature infections, a total of 7.9%. The variation in this latter series is very great and no reason for it can be seen, as reference to the table will show that it is not due to temperature conditions alone.

The bacteria in the gut of the fly vary greatly in number and several species occur. It is suggested the variations in the degree of bacterial infection of the gut may have played some part in determining the rate of infection and this would be a very difficult factor to evaluate.

Again, variations in the nutrition of the flies after the infective meal is another factor influencing the infection rate. This may be partly a mechanical effect but also there is no doubt it is connected with the trypanolytic action of the blood on the gut trypanosome. These variations make it impossible to be certain that the mixing of the strains was the factor that gave the higher total rate of infection, though it is highly suggestive that this was so.

These experiments are to be repeated since, if confirmed, the fact that two old strains can regenerate one another would have an important bearing on the epidemiology of the disease.

THE MECHANICAL TRANSMISSION OF WEST AFRICAN STRAINS OF *T. brucei* AND *T. gambiense* BY GLOSSINAE AND OTHER BITING FLIES.

Preliminary.—The objects of the present investigation were, first, to determine whether strains of *T. brucei* and *T. gambiense* from Northern Nigeria were transmissible by the direct method, and to attempt to come to some conclusion as to the conditions under which this mode of transmission may come into play; secondly to estimate the comparative importance of tsetse and other biting flies as possible mechanical vectors of trypanosomiasis in West Africa; and, finally, to determine accurately the length of time trypanosomes may remain alive and active in the proboscis of glossina and other blood-sucking diptera after an infecting bite, for it is on this factor that the success of mechanical transmission depends. The conclusions as to the factors influencing mechanical transmission of trypanosomes are largely based on a series of experiments carried out with *T. brucei* in guinea pigs. This organism has the advantage of producing a virulent type of infection in guinea pigs with a short incubation period, so that the result of an experiment is not long in doubt. *T. gambiense* in monkeys is not so virulent; trypanosomes are usually very scanty in the peripheral blood, and the incubation period is a long one.

I.—DIRECT TRANSMISSION OF *T. brucei* AND *T. gambiense* BY *G. tachinoides*.

1.—*Technique*.

Through the experiments described below the flies were kept singly in small glass tubes closed at the ends by large mesh netting. The tube in each case was applied to the infected animal, and the fly watched until the flow of blood into the abdomen commenced; it was then removed, and transferred after the requisite interval to the clean animal, on which it was allowed to complete its meal. Where the number of flies to be employed in any one experiment was large, or the supply of bred flies scanty, the infecting bites were spread over a short period, usually one week. The results obtained were similar, whether the bites were all inflicted on one day, or spread over several days. The experimental animals employed were kept in fly-proof cages throughout the experiments.

2.—*G. tachinoides* as mechanical vector of *T. brucei*.

Forty direct transmission experiments have been carried out, in all of which laboratory bred *G. tachinoides* were employed. The experimental animals were chiefly guinea pigs, but dogs and monkeys were also used. Three strains of *T. brucei* were employed, all of these having originated from infections in wild flies. The objects in view

during these experiments were the determination of (1) the maximum interval which may intervene between the infecting and the clean feeds of flies used in a positive direct transmission experiment: (2) the minimum number of flies necessary to effect a positive transmission: (3) the part played in direct transmission by the scarcity or abundance of trypanosomes in the peripheral blood of the infected animal used: (4) the direct transmissibility of the trypanosome strains used. These questions are dealt with separately below.

(i) *Interval between Infecting and Clean Meals.*

The shortest possible period intervening between the withdrawal of the tsetse's proboscis from the infected animal, and its insertion in the clean one is approximately five seconds. In practice it was found that the flies would often take longer than this to recommence their feed, and the actual minimum break in a series of flies works out at between five and sixty seconds. This is the 'instantaneous transference' of Bruce. This forms the first of the five groups of increasing intervals into which the present experiments are divided. The longest interval was one hour.

TABLE I.

THE EFFECT OF INCREASING THE INTERVAL BETWEEN THE INFECTING BITE AND THE RESUMPTION OF THE MEAL ON A CLEAN ANIMAL IN DIRECT TRANSMISSION EXPERIMENTS WITH *G. TACHINOIDES* AND *T. BRUCEI*.

Interval.	No. of experiments.	Total No. of flies used.	Average No. of flies used.	Proportion of transmissions obtained.
5-60 seconds	19	1-120	29	7/19
5-7 minutes	4	4-60	35	1/4
10-20 minutes	6	10-120	63	1/6
30-35 minutes	6	20-120	68	0/6
60-65 minutes	3	60-150	90	0/3

Reference to Table I shows that of the nine positive results obtained in thirty-eight experiments, seven fall into the 'instantaneous transference' group. The nine experiments comprising the last two groups (30-35 minute, and 60-65 minute) all gave negative results, in spite of the fact that the average number of flies used in these experiments was almost three times that of the flies used in the 'instantaneous transference' and 5-7 minute groups. The fact that an average number of seventy-nine infecting bites spread over a period of six days failed to transmit the disease in any one of the nine experiments where the interval between the infecting and the clean feeds was more than thirty minutes, suggests that mechanical transmission after a similar interval must be extremely rare in nature, where the contact between fly and its host can very seldom be close enough to enable so many interrupted feeds to occur in so short a period. In the 'instantaneous transference' group positive transmissions were obtained in five out of seven experiments where the total number of flies used exceeded forty. In the 5-7 minute group, positive transmissions were obtained in one experiment out of the two where the total number of flies used was sixty; while in the 10-20 minute group, one experiment out of four gave positive results where the total number of flies used was sixty or more.

(ii) *Number of Flies used.*

The effect of varying the numbers of flies used in direct transmission experiments is best seen by examination of the results obtained in the 'instantaneous transference' group of experiments. These are summarised in Table II.

TABLE II.

THE EFFECT OF USING VARYING NUMBERS OF *G. TACHINOIDES* IN THE
DIRECT TRANSMISSION OF *T. BRUCEI*.

Expt. No.	Interval.		Total No. of flies used.	No. of flies used daily.	Result.	Incubation period.
2	30 seconds	...	1	1	—	17 days.
5	30 seconds	...	4	4	+	
8	5-30 seconds	..	5	5	—	
12	do.	...	5	5	—	
28	do.	...	6	1	—	
29	do.	...	6	1	—	14 days.
37	do.	...	6	1	—	
38	do.	...	6	1	+	
14	do.	...	10	10	—	
9	do.	...	21	21	—	
10	do.	...	41	41	+	7 days.
18	do.	...	60	10	+	8 days.
22	do.	...	60	10	+	9 days.
35	do.	...	60	10	+	*16 days.
43	do.	...	120	20	+	9 days.

* 'C' strain used.

In eleven experiments in which the total number of flies used varied from 1-21 two positive results were obtained. One of these was in Experiment 2, in which four flies were used in one batch. The other was one of four experiments in which six flies were used, a single fly being used daily for six days.

In the remaining five experiments in which the total number of flies used varied from 41-120, positive results were obtained in every case.

It is of interest to note that where positive results were obtained in experiments 5 and 38 using four and six flies respectively, the incubation periods were seventeen and fourteen days. Where the total number of flies used exceeded forty (experiments 10, 18, 22, 35, 43), the incubation period was reduced to 7-9 days in each case except in experiment 38, where the period was sixteen days. This exception is probably accounted for by the fact that the 'C' strain was used, whereas in the other the more readily transmissible 'E' and 'CD' strains were employed.

(iii) *Number of Trypanosomes in the peripheral blood of the Infected Animal.*

The determination of the effect of the abundance or scarcity of trypanosomes in the peripheral blood of the infected animal used in direct transmission experiments had not been thoroughly carried out and, the figures obtained require amplification. *T. brucei* is normally very numerous in the blood of guinea pigs and it is rare to find a case where the trypanosomes are as scarce as in *T. gambiense* infections in monkeys or guinea pigs. The basis on which comparison is made is the average number of trypanosomes per microscopic field (1/12 obj. 6 x eyepiece) in fifty fields of a stained thin blood film.

From the results obtained it is clear that direct transmissions are readily obtained, where other conditions are suitable, when the concentration of trypanosomes in the peripheral blood of the infected animal is in excess of one per microscopic field. Where the number of trypanosomes fell below one in five fields, no positive results were obtained in any one of four experiments, although the number of flies used was increased.

It seems probable that this factor of trypanosomes abundance or scarcity in the peripheral blood plays a large part in determining whether mechanical transmissions may or may not become important in the spread of trypanosomiasis, and further work on the subject is needed.

3.—*G. tachinoides* as mechanical vector of *T. gambiense*.

Ten direct transmission experiments in which three strains of *T. gambiense* were used have been carried out. The strains were obtained from Sherifuri Sleeping Sickness cases, and the monkeys used were inoculated directly from the human case. The numbers of flies used varied from 60-180, and were laboratory bred. The infecting bites in each experiment were spread over a period of six days.

The instantaneous transference method was employed. The average number daily of trypanosomes in the peripheral blood of the infected monkeys during the period of infecting feeds varied from one in fifty microscopic fields to one in two fields. The results were negative in every case.

II.—DIRECT TRANSMISSION OF *T. BRUCEI* BY BITING FLIES OTHER THAN GLOSSINÆ.

1.—Preliminary.

In attempting to estimate the relative importance of biting flies other than Glossinæ in the mechanical dissemination of trypanosomiasis, one is handicapped in this part of the Northern Provinces by the scarcity or extreme seasonal variation in numbers of blood-diptera. In the six months during which the present work has been carried out, culicidæ, (consisting largely of Anophelines) and two species of the genus *Stomoxys* have been the only blood-sucking flies readily obtained. *Lyperosia* (sp?) was caught in fair numbers on cattle in the months of the early rains (May and June) but was only obtained with difficulty and in very small numbers in September, when it had been intended to use it in direct transmission experiments. The tabanidæ are always very scanty in this district, and could never be obtained in sufficient numbers to make it possible to carry out direct transmission experiments by their agency. *Hippobosca* is found on cattle at all seasons, but it is a most difficult fly to keep alive under laboratory conditions and it is only occasionally that it can be persuaded to feed on the experimental animals. Further attempts to use this fly in these experiments are to be made. *Stomoxys calcitrans*, *Anopheles costalis*, *A. funestus*, and *Aedes vittatus* have been used in the series of experiments recorded below.

2.—Technique.

The technique employed was identical with that described in the above experiments with *G. tachinoides*. Much more difficulty was experienced in inducing the flies to feed, and only a small percentage of the flies in any one batch were successfully used. Where possible, bred flies were used, but the large proportion of newly emerged flies which died without feeding made it necessary to supplement them with wild flies. Dissections of large numbers of wild *anophelines* failed to reveal any flagellate infections and the only flagellate encountered in dissections of wild *S. calcitrans* was a scanty crithidia confined to the mid-gut.

3.—Description of Experiments.

Table III records the results of ten direct transmission experiments using *S. calcitrans* as vector; five experiments in which *A. costalis* and *A. funestus* were used, three using *Aedes vittatus*, and three preliminary experiments with *Lyperosia* (sp), have also been carried out.

TABLE III.

DIRECT TRANSMISSION EXPERIMENTS EMPLOYING STOMOXYS AS VECTOR.

Expt. No.	Date.	Total No. of flies used.	Interval.	Tryp. used.	Av. No. of tryps. in blood.	Inf. animal.	Clean animal.	Result.
*S10	9.10.29-10.10.29	7	5-30 secs.	T. brucei (E)	1 in 5 fields	G. pig 73	G. pig 86	-
*S2	1.7.29	10	5-30 "	T. brucei (CD)	20 per field	G. pig 722	G. pig 26	-
*S1	29.6.29	11	5-30 "	T. brucei (CD)	39 " "	G. pig 722	G. pig 25	-
*S8	11.9.29-14.9.29	14	5-30 "	T. brucei (E)	14 " "	G. pig 59	G. pig 75	+
*S4	21.8.29-27.8.29	24	5-30 "	T. brucei (E)	11 " "	G. pig 807	G. pig 61	-
S3	13.8.29-17.8.29	39	5-30 "	T. brucei (E)	16 " "	G. pig 806	G. pig 49	+
S6	3.9.29-7.9.29	39	5-30 "	T. brucei (E)	28 " "	G. pig 59	G. pig 70	-
S5	26.8.29-31.8.29	41	5-30 "	T. brucei (E)	7 " "	G. pig 807	G. pig 62	+
S7	10.9.29-14.9.29	23	5 minutes	T. brucei (E)	28 " "	G. pig 59	G. pig 74	-
S9	24.9.29-1.10.29	41	5 minutes	T. brucei (E)	40 " "	G. pig 75	G. pig 80	-

* Bred S. calcitrans used.

Three out of the ten stomoxys experiments gave positive results, the numbers of flies used in each being 14, 39 and 41. These three positive results were obtained by instantaneous transference of the flies from the infected to the clean guinea pig.

The eight mosquito experiments, in which from 7-43 flies were used, gave uniformly negative results. The instantaneous transference method was used in each case. The three lyperosia experiments also gave negative results, but here the numbers of flies used were too small for any opinion to be arrived at as to the likelihood of this fly acting as a mechanical vector of trypanosomiasis.

III.—SURVIVAL OF TRYPANOSOMES IN THE PROBOSCIS OF GLOSSINA AND OTHER BITING FLIES.

1.—Technique.

The technique employed was similar to that described above; the flies were dissected at increasing intervals after the infecting feed, and the proboscis examined for trypanosomes.

2.—Survival of Trypanosomes in the Proboscis of Glossina.

Table IV summarises the experiments carried out with *G. tachinoides*, *T. brucei* and *T. gambiense* were the trypanosomes used, and the experiments are divided into five groups according to the numbers of trypanosomes in the peripheral blood of the infected animal.

TABLE IV.

SURVIVAL OF TRYPANOSOMES IN THE PROBOSCIS OF *G. tachinoides* AT INCREASING INTERVALS AFTER BROKEN INFECTING FEED.

Trypanosomes in peripheral blood.	2-5 minutes.		5-15 minutes.		15-30 minutes.		30 minutes -1 hour.		1 hour-2 hours.		2 hours-3 hours.		3 hours-4 hours.	
	No. of flies contg. tryps.	Tryps.	No. of flies contg. tryps.	Tryps.	No. of flies contg. tryps.	Tryps.	No. of flies contg. tryps.	Tryps.	No. of flies contg. tryps.	Tryps.	No. of flies contg. tryps.	Tryps.	No. of flies contg. tryps.	Tryps.
30 per field (or over)	25/25	++	21/27	++	20/27	+	7/33	+	5/32	+	2/31	+	1/9	+
1 per field ...	5/11	+	0/10	-										
1 in 10 fields ...	8/18	+	3/16	+	1/10	+	0/15	-						
1 in 25 fields ...	1/12	+	1/13	+	0/7	-	0/9	-						
1 in 50 fields ...	1/2	+	0/5	-	0/5	-	0/10	-	0/10	-				

Notes ++++ 100 tryps. or over, +++ 50-100, ++ 10-50, + 1-10.

The table calls for little comment. The longest survival period observed was in the case of one fly dissected after three hours had elapsed since its infecting meal; three active trypanosomes were seen in its proboscis, with very scanty blood corpuscles.

In the first group (trypanosomes in blood thirty per field or over), a large percentage of flies were found to contain active trypanosomes in the proboscis at intervals up to thirty minutes after the infecting meal. In the latter groups, where the trypanosomes in the peripheral blood are much more scanty, both the infection rate and the number of trypanosomes per infected proboscis were very considerably reduced. The maximum number of trypanosomes counted in a single proboscis dissected immediately after the infecting meal was 660; the actual maximum is often very considerably in excess of this.

The activity of trypanosomes in the proboscis of glossina after an infecting meal remains unimpaired for at least three hours, and is in marked contrast to the rapid loss of motility and the heavy mortality of the same trypanosomes in the gut of the fly. The medium in the labial groove, consisting as it does, of salivary secretion, appears to be very favourable to the survival of the blood forms of trypanosomes. The rapid fall in the number of trypanosomes in the proboscis after the break in the infecting feed seems to be due to the flow of salivary secretion backwards from the proboscis, which serves to clear the labial groove from the debris of the last meal.

3.—*Survival of Trypanosomes in the Proboscis and Gut of various Blood Sucking Diptera.*

In *Stomoxys* the conditions in the proboscis, or its structure, appear to be unfavourable to the survival of trypanosomes. Out of thirteen flies dissected immediately after an infecting feed on an animal having a heavy trypanosome infection of the peripheral blood, only three were found to have the proboscis containing trypanosomes. No flies dissected after the lapse of five minutes from the break in the infecting feed showed any trace of trypanosomes or blood in the proboscis. In the gut of *Stomoxys*, blood trypanosomes lose their motility rapidly, and one hour after an infecting feed living trypanosomes are only found with difficulty. There is then a phase of rapid division, resulting after twenty-four hours, in a fairly high rate of infection (about 50%), the infections consisting of very active forms. Stained films show these forms to be entirely trypanosomal, largely composed of very short forms. This infection dies out during the second day.

In the mid-gut of *A. costalis* and *A. funestus*, a similar course of events is followed; the initial heavy infection with blood trypanosomes dies out, and is followed by rapid division of surviving trypanosomes, resulting in twenty-four hours in a light infection of short, very motile trypanosomes. Further starvation, or a clean blood meal results, as in *stomoxys*, in the destruction of the infection.

In the proboscis of *Anopheles* trypanosomes were only once seen; this was in the case of a *funestus* dissected twenty-nine minutes after an infecting meal. The infection consisted of twenty very active trypanosomes in the proboscis.

The Adhesion Test applied to Cattle.

The following is a brief account of an attempt to use the "adhesion phenomenon" to demonstrate chronic trypanosomiasis in Fulani and Pagan cattle.

Fulani Cattle.

By kind permission of the Chief Veterinary Officer this work was carried out at Foggo Veterinary Camp which is situated in Katagum Division, about thirty miles south-west of Azare. The Fulani bring their cattle for double inoculation against rinderpest, from the surrounding country within a radius of 100 miles. The cattle examined were chosen at random from among the herds assembled there and as such can be taken to be representative of the Fulani cattle in the north.

The trypanosome strains used were:—

- (1) *T. brucei* strain D obtained from wild *G. morsitans*. It had been maintained in dogs and monkeys for two months, had an incubation period of about three days and proved fatal to dogs in 7-14 days.
- (2) *T. congolense* strain F obtained from wild *G. morsitans* and maintained in sheep and dogs.

The virulence to dogs had been increased to give an incubation period of five days.

In carrying out these tests, the presence of *T. vivax* was discovered occasionally, owing to its high degree of motility. This contamination would be noticeable only when the plasma of the animal being examined contained a large number of trypanosomes.

The results of these experiments are given in Table I.

TABLE I.—AN APPLICATION OF THE ADHESION TEST TO FULANI CATTLE.

No. of Animals in Group.	T. BRUCEI.			T. CONGOLENSIS.			T. vivax seen accidentally.
	No. tested.	Positive.	Doubtful.	No. tested.	Positive.	Doubtful.	
13	13	1	1	0	—	—	1
52	52	3	0	0	—	—	1
19	19	0	0	19	2	1	0
60	0	—	—	60	12	0	2
60	60	0	0	60	4	1	2
60	0	—	—	60	11	0	1
33	33	1	0	33	5	0	0
66	66	3	0	66	7	0	0
51	51	1	0	51	25	0	1
60	60	0	1	0	—	—	0
60	0	—	—	60	11	1	4
60	60	0	0	60	9	1	0
33	33	0	0	31	0	0	0
56	56	0	0	0	—	—	0
683	503	9	2	500	86	4	12

Out of 503 beasts tested against *T. brucei*, nine gave a positive result, giving an infection rate of 1.8%. This figure is great contrast to the 37.5% given by wild game in the Sherifuri district. There appears to be no record of cattle dying from *T. brucei* infections in this country, as the Nigerian strains are practically non-pathogenic to cattle.

T. congolense gave a much higher result. Out of 500 animals tested eighty-six were positive an infection rate of 17.2%. These figures are specially interesting as they show that large numbers of apparently healthy cattle are carrying *T. congolense*. In East Africa this tryp. is very pathogenic to cattle while in Nigeria *T. vivax* infection seems to be the killing disease, *T. congolense* being much less pathogenic to cattle. *T. vivax* was found accidentally in 1.7% of the total number of cattle examined, but the real infection rate must be very much higher than this figure. Even after allowing for a certain number of double infections over 30% of these Fulani cattle must have dormant trypanosome infections.

During the period over which these investigations were being carried out, the mortality rate due to the double inoculation was 3-4%. It is almost certain that the majority of these deaths are not caused by the rinderpest itself, but are due to the flare up of a latent trypanosomiasis. The additional strain of the rinderpest inoculation has an adverse effect on the animals' resistance. It is suggested that the animals that succumb are those with a recently acquired infection, as they will not have had the time to develop sufficient anti-bodies to counteract the extra strain on the organism.

PAGAN DWARF CATTLE.

The animals examined were the pagan dwarf cattle belonging to those Munshi tribes inhabiting the Benue district between Makurdi and Ibi. As these animals are extremely wild, living in fly infested "Kurumi" in much the same way as game, it was very difficult to obtain samples of this blood for examination. During a six week's trek only 125 cattle could be examined.

The adhesion test was done with *T. brucei* alone, the *congolense* strain having failed. This accident was caused by the fact that the Munshi hunting dogs, used for maintenance of the strain, were highly resistant to *T. congolense*. In order to supplement the test, fresh blood films were made from each animal and were examined for living trypanosomes.

TABLE II.—TRYPANOSOME INFECTIONS IN PAGAN CATTLE.

No. of Animals in Group.	ADHESION TEST USING T. BRUCEI.		EXAMINATION OF FRESH FILM.	
	Positive.	Doubtful.	T. Congo- lense.	T. Vivax.
6	3	0	0	0
10	1	0	1	0
8	0	0	0	0
3	3	1	0	0
6	1	0	1	0
13	0	0	0	0
7	0	0	0	0
19	2	0	1	0
28	1	1	1	1
7	0	0	0	0
12	0	0	1	0
125	11	2	8	1

Out of 125 animals tested against *T. brucei*, eleven gave a positive result, an infection rate of 8.8%. This is much higher than that of the Fulani cattle, and approximates to that of the wild game in the district. An examination of twenty-four game animals gave a positive result to *T. brucei* of 12.8%. By the examination of fresh films *T. congolense* was found in 6.4%, *T. vivax* in 0.8% of these animals. No *T. brucei* were seen in the blood examinations.

These pagan cattle are not immune to trypanosome infections, but they do have a high degree of resistance, probably due to the conditions under which they live. When they are subjected to the strain of rinderpest inoculation, the balance of their resistance is upset and they die of trypanosomiasis. It seems likely that if the pagan cattle were subjected to the same conditions of stress, long treks, shortage of water, etc., as the Fulani cattle, they would revert to the disease in much the same way. In this connection the observation that pagan cows, positive to fresh blood examination were in poor condition compared with others that were negative, is very suggestive.

The Blood Chloride in Sleeping Sickness with a note on the Prognosis.

The concentration of chlorides in the blood of sixty sleeping sickness patients was followed during the course of treatment. No significant changes were found. It was observed that the prospects of recovery were associated with the social condition of the patient.

The Work of the Sleeping Sickness Officers.

During the year, 3,629 new cases of sleeping sickness have been treated by the Sleeping Sickness Officers attached to the Investigation. A large proportion of these cases was found in the Plateau Province

through which the disease is very widespread, reaching epidemic proportions in places. A summary of the work done in the provinces and districts follows.

Plateau Province.—2,756 cases.

Ganawuri district, 1,515 cases. The position here is very serious, and in spite of the large number of cases treated there is no sign of any abatement in the epidemic. As there are several points of unusual interest, a fuller report of this epidemic is given at the end of this review.

Akwanga Division.—966 cases. The Mama district, the part most heavily infected, is approximately 100 square miles in area and lies below the escarpment. It is watered by the Farin Ruwa, the Rafin Jini, and their tributaries. The villages are situated on the summits of closely wooded hills, and in most cases are surrounded by dense Kurumis; some few have their backs to the escarpment; and, rarely some have undulating ground in their neighbourhood. A little clearing has been done in the neighbourhood of Kwara Babba and Marhai. Dr. F. Kane visited this district in April, 1929, and stayed four months, during which time he treated 565 cases. Dr. H. C. E. Chantler arrived in November and has treated 512 cases, 111 of these being relapses or re-infections. The largest numbers of cases come from Tigwan, Wamba, Akwanga and Kwara.

Jos Division.—115 cases. Dr. Hope-Gill paid a short visit during June, 1929. Miango and Kwall were visited, and cases were found, but the district is still relatively untouched. The presence of tsetse and sleeping sickness high up on the hills of Jos Division has been proved.

Pankshin.—108 cases. Dr. Hope-Gill was here in July, 1929. The disease here appears to be of a mild type. At Toff, seventy-seven cases were found. This village is situated high up on the escarpment. A kurumi runs through the village, but it is thought that most of the cases are infected while visiting Mama country.

Jemaa Division.—Fifty-two new cases were treated by Dr. J. C. Paisley in March, 1929. The protective clearings at New Jemaa have been maintained. It is believed that much sleeping sickness exists in the pagan villages near Kafanchan, but the inhabitants cannot be induced to come in for treatment.

Bauchi Province.—394 cases. Sherifuri and Gadau, 354 cases. These cases have been treated during 1929 at the Sherifuri and Gadau Sleeping Sickness Clinics by Drs. Kane, Paisley and Brander.

Ningi.—Thirty-seven cases were treated here during a short visit by Dr. C. W. Hope-Gill in October, 1929.

Tirwan.—Protective clearing was carried out here by Capt. Warren, and sleeping sickness cases treated by the Medical Officer, Bauchi.

Kano Province.—305 cases. Trypanosomiasis has been found to be endemic over the whole of the southern half of Kano Province and also along the eastern border from Gwaram to Jafun and Hadeija. Owing to the exigencies of leave and pressure of work in other provinces, much of this area had to be left unvisited in 1929.

The following districts were visited by Dr. G. G. Brander:—Tudan Wada, sixty-three cases; Rano, twenty-six cases; Dutsi, thirty-seven cases and Kiyawa, thirteen cases. Dr. C. W. Hope-Gill also visited the south-east sleeping sickness areas treating sixty-one cases at Birnin Kudu and 105 at Gwaram.

Zaria Province.—116 cases. On the western edge of the Plateau, Dr. Hope-Gill obtained fifty-six cases of sleeping sickness from Pitti, and fifty-one from Cameroo. In the course of a tsetse survey carried out in southern Zaria during April, 1929, by Mr. A. W. Taylor, nine cases of sleeping sickness were diagnosed and treated at Kagerko.

Cameroons.—Sixty-seven cases were treated here by Dr. P. H. Rawson during February, 1929, the majority of the cases being found at Tiko. The disease is widespread in this area, being found along the creeks and up the Mongo River. It was first discovered among the labourers working on the fruit plantations and three cases also occurred among the European Staff.

THE GANAWURI SLEEPING SICKNESS EPIDEMIC.

The following is an account of the sleeping sickness epidemic in the Ganawuri villages.

1.—*General Description of Ganawuri.*

The Ganawuri villages are about thirty miles from Jos and extend for about eight miles along the Ganawuri hills, which run in a south-east to north-west direction. The villages have been built on the very steep hillside with practically no houses on the level ground. They are bounded to the north-west by the Kaduna river and to the south-east by a fair-sized stream which flows through the Kwakwi pagan village. The hills overlook a plain about twelve miles wide through which flows the Kaduna river. Between the Kwakwi stream and the Kaduna river, rising in the hills, and eventually joining the river Kaduna, are very numerous streams, some of the rainy season torrent type dry for most of the year, and others of more or less permanent character. Many of these streams flow for the first part of their course on the river plain through deeply cut ravines, often with precipitous sides. Across the plain lie the Marwa hills on which are situated the Marwa villages. The combined population of Ganawuri and Marwa is over 8,000.

2.—*Tsetse 'Bush'.*

The localisation of the tsetse 'bush' is of considerable interest. There is a more or less continuous strip of forest following the base of the hills and extending down the streams into the river plain where the precipitous nature of the banks has not made it worth the while of the local farmers to clear the banks for cultivation. In some of these streams this line of heavy shade may extend as much as half a mile from the base of the hills. The hillsides, where not absolutely precipitous, are fairly thickly wooded, and dense 'kurumis' may centre round the springs and streams. The river plain shows signs of having contained originally very large areas of forest land, and there is a patch of dense forest (half mile by quarter mile) four miles west of the Ganawuri Rest House which shows admirably what must have been the general type of vegetation along the streams. Apart from this, the plain is extensively farmed by Ganawuri and Marwa pagans and also affords grazing for large herds of Fulani cattle. The streams flowing through it are, for the most part, farmed up to the banks, and possess no bordering shade whatever.

3.—*G. palpalis at Ganawuri and its relation to the Epidemic.*

As may be inferred from the above account, tsetse is extremely limited in its range. The only species found is the large riverine species, *G. palpalis*. It is confined to the permanent or semi-permanent hill streams and at this time of the year is only present in appreciable numbers at the immediate base of hills, where shade and water are most abundant. It is probable that during the rains, when conditions of shade and humidity are most favourable to the fly, it spreads through the villages on the hillside. Evidence that this spread actually takes place is provided in the fact that a few *G. palpalis* have been taken, even as late in the year as this, in the main village at a height of about 600 feet above the plain. Dissection and examination of locally-caught tsetse is revealing the interesting fact that the fly is deriving its entire food supply from the blood of man and his domestic animals (sheep, goats and horses) the proportion of the two types of blood being about equal. Aquatic reptiles and game, which normally provide *G. palpalis* with a large proportion of its food, are here entirely absent.

The relative scarcity of tsetse in this locality is so striking that it seemed possible that the normal means of transmission of the disease by cyclically infected tsetse was being replaced by direct transmission by other biting flies.

The high infection rate in the tsetse here, as demonstrated by examination of over 300 locally-caught flies has furnished convincing evidence that the disease is being transmitted in the usual way, and that it is the exceptionally close contact between man and tsetse which is responsible for the present epidemic. This intimacy of the fly-man contact is most impressive. Tsetse are only found on the village streams, and they are most numerous at path crossings and village watering places; these points frequently possess but scanty shade, yet tsetse are readily found, whereas densely shaded ravines containing water, but unfrequented by man or domestic animals may be entirely tsetse-free.

In view of the not uncommon belief that the presence of tsetse on the high ground of the Bauchi Plateau is due to a widespread invasion during recent years, it is worth while to state here that this is certainly not the case. All the evidence goes to show that in this locality, at least, the clearing for farm land of an originally heavily forested plain has driven out tsetse, and that it is only in the scanty remaining fringe of forest bordering the base of the hills that a small colony of *G. palpalis* is maintaining itself.

4.—*History of the Epidemic.*

The probable sequence of events leading up to the present epidemic would appear to be as follows:—The Ganawuri tribe used to live by hunting, the river plain originally containing much game. At this time there would be much forest land, concentrated along the streams and rivers, and doubtless infested by tsetse. As the game became scarcer, the pagans turned to farming, and the various streams were cleared, thus driving back the tsetse, into the remaining forest belt, along and on the hills on which the Ganawuri had built their villages. As the game had been completely exterminated, and aquatic reptiles are here absent, the tsetse was forced to turn to man and his domestic animals for its entire food supply, thus leading to the present intimacy of fly-man contact. All that was not necessary to start an epidemic was the introduction of a virulent strain of *T. gambiense*, and this evidently took place within very recent years. Local report attributes the introduction of the disease to the visit of a case from Jemaa some six years ago.

The district was first visited by a Sleeping Sickness Officer in November, 1928, and in three months over two thousand sleeping sickness cases were diagnosed and treated. At the end of this period new cases were coming in just as rapidly as at the beginning. At another visit in November, 568 cases were diagnosed and treated in the first six weeks. It is probable that over 50% of the total population are infected with the disease. Many of the cases found in the second visit were patients who had relapsed through having had insufficient treatment previously. The disease has increased in virulence and the depopulation of some of the villages is a striking testimony to its ravages.

Effective treatment of the people is very difficult. The full course consists of twenty-five grammes of tryparsamide given in twelve injections spread over a period of six weeks. As the results of the first few injections are striking, the patients believe themselves cured and refuse to come up for further treatment. Consequently the improvement is only of a temporary nature.

5.—*Method of dealing with the Epidemic.*

Three methods of dealing with the epidemic present themselves.

The first, by means of treatment of the disease, is being carried out, but up to the present time the results have been very disappointing. It is very doubtful whether treatment *per se* can solve the problem, even if strict compulsory measures could be enforced to make the people come

up for a full course of injections. The intimacy of the fly-man contact is so great that the cured cases will be reinfected in a year or two when the acquired immunity has diminished.

The second, which consists of exterminating the fly by clearing, would be very difficult to carry out. It would involve the very thorough clearing of about eight miles of hillside, the strips of forest along the hill base, and of very numerous streams, (the lengths of which requiring clearing vary from a few yards to half a mile). The precipitous nature of the banks of many of these streams would make clearing operations very difficult if not impossible. The cost of such a scheme would be exorbitant and would involve recurring expenses for its upkeep.

The third method is to induce the pagans to move their villages on to the tsetse-free river plain. From every standpoint such a move appears to have everything to recommend it. They would be in the middle of their farms and would have an excellent water supply. The removal of the villages would have to be thorough, as the villagers would have to be prevented from wandering back to the hills and using their present watering places.

This last method of dealing with the situation is the one that was recommended.

All the people have moved out on to a new site about two and a half miles out on the plain, and the line of new villages extends for five and a half miles along the tributaries of the Kaduna river. Now that these pagans have been moved from the fly area, it should be possible to bring the epidemic to an end by intensive treatment.

APPENDIX C.

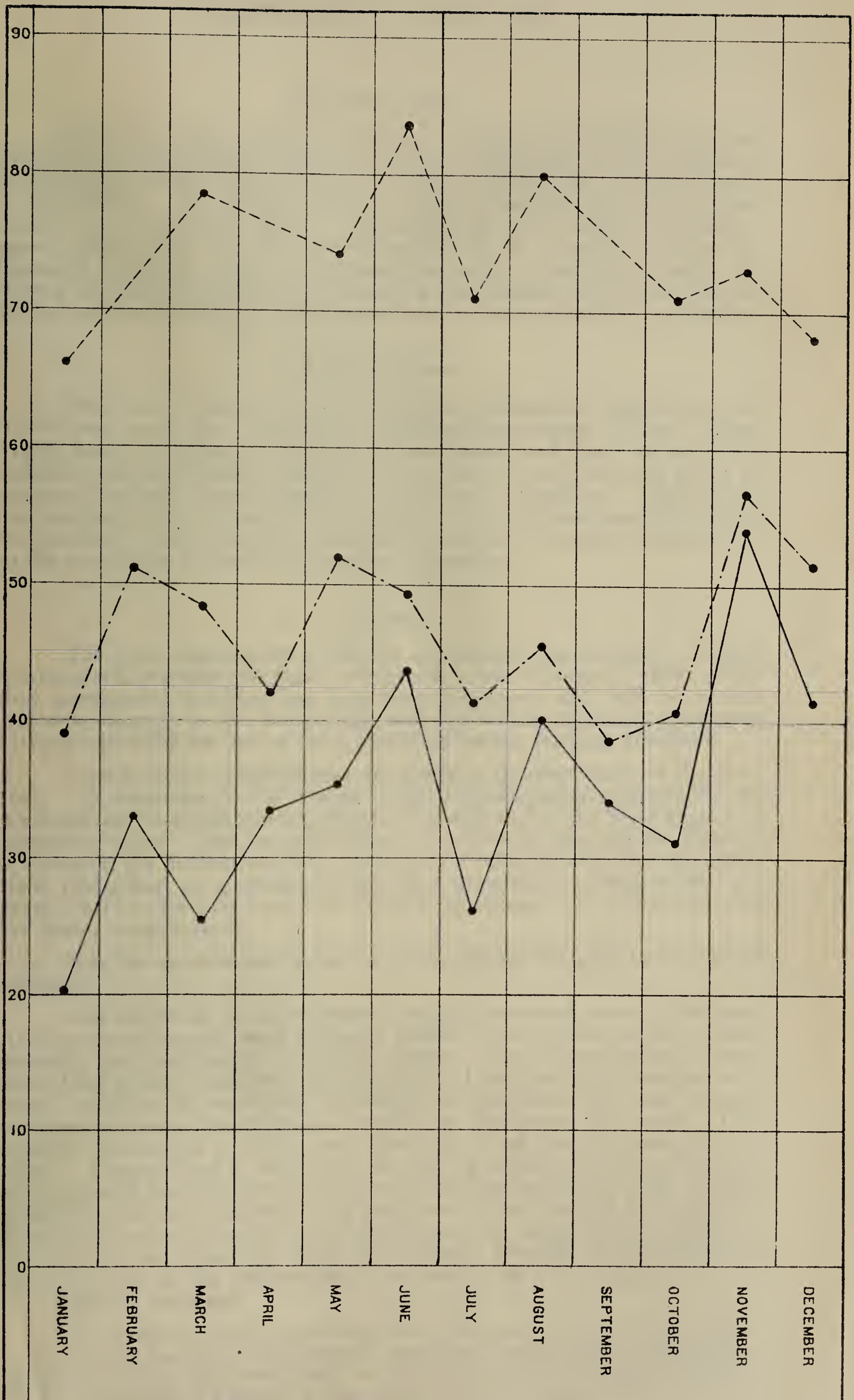
ANNUAL REPORT OF THE AFRICAN HOSPITAL
LABORATORY, LAGOS, 1929,

BY

H. MORRISON, M.A., M.D., B.CH.
Pathologist.

1929

CHART N°2.



----- % RATE OF HELMINTHIC INFESTATION IN STOOLS
 - - - - - " " " ASCARIS " " "
 _____ " " " ANKYLOSTOME " " "

ANNUAL REPORT OF THE AFRICAN HOSPITAL LABORATORY, LAGOS, 1929.

EUROPEAN STAFF.

There has been a certain number of changes in the staff during the year and this unfortunate lack of continuity has made it rather difficult in writing a concise report when, for eight months, the work has been in other hands. Dr. Ramsay was in charge for the first two months after which he proceeded on leave. Following him, and owing to the shortage of Pathologists, Dr. E. C. Smith and Dr. J. A. Young of the Medical Research Institute, Yaba, supervised the work in the Laboratory. To them I am deeply indebted, as it meant a considerable addition of labour to their own researches. I resumed duty on the eleventh of September.

AFRICAN STAFF.

This staff consists of one second-class laboratory attendant, two third-class, and one laboratory attendant-in-training. Much supervision has to be given to the latter two classes and their independent judgment is not always fraught with wisdom. Lectures are given at regular intervals; these, however, I consider a formality. The lecture-demonstrations are of much more value. It is unfortunate that, up to the present, a better and more educated class of boy cannot be attracted to the promising future for laboratory attendants.

GENERAL.

The new Laboratory is almost completed and a move to these quarters will probably be made towards the end of January, 1930. This new permanent building has long been necessary and will be a very welcome change to the temporary and somewhat unpleasant habitats hitherto detailed for use as the Laboratory in the African Hospital.

Post-mortem examinations are lower in number than for the year 1928. In deference to the wishes of the Mohammedan community, no post-mortem examination is performed except under the legal aegis of a coroner's order. This reduction has, of necessity, limited the amount of material for section-cutting. It must be remembered that examinations performed on a coroner's order are generally on bodies dead for more than twenty-four hours, and which, therefore, are quite unsuitable for tissue examination.

Routine examinations show an appreciable increase in almost all sections.

The advice of the Laboratory is sought more and more by the local African practitioners, and a steady stream of material comes in from stations, geographically served by Lagos. The accompanying charts show that (1) the mean annual incidence of malaria still remains very high. One has to remember, in connection with this fact, that the percentage of mosquitoes infected is easily the highest in the world. It is difficult to forecast a time when this state of affairs will alter for the better. Lagos island is particularly low-lying with practically no natural drainage and the large area of swamp in the comparatively near vicinity makes it well-nigh impossible to improve on the present anti-malarial campaign, except at a most prodigious cost. It is noticeable, however, that among the educated classes of African, malaria is becoming less frequent; and, as the knowledge of combating the disease grows so will the incidence decrease.

The second chart, recording the total percentage of helminthic infection and the individual rates of ascaris and ankylostome infestation, illustrate vividly the need there is for a water-borne sewage system in the town proper of Lagos. I am quite convinced that such a scheme

would reduce very markedly the large amount of, what one might term, minor sickness in the African; reduce also the number of lost working days; so that while giving better health to the community such a system would be of financial remuneration to the Government, both directly and indirectly

1.—EXAMINATION OF BLOOD.

Routine examination of blood is the rule for all in-patients of both the European and African Hospitals. The accompanying chart reveals the incidence of malarial infection during the year and for comparison the percentage figures for last year (1928) are also given.

No parasites of benign tertian fever have been found. Reference to previous reports shows that during the last few years this type of malarial fever has gradually been becoming scarcer. The percentage of quartan parasites is lower and this fever still seems to occur, for the most part, in the dry season. Crescents are most frequently found in the first and last quarters of the year, and generally in the blood films from infants and young children; although a film showing the largest number of crescents per field I have ever seen came from a European of thirty-five years of age.

A total of 4,792 slides have been examined, showing an increase of nearly 1,200 over 1928. Of these, 1,172 (excluding crescents) showed the presence of parasites, and, giving a percentage of 24.4.

Of the above total 762 films were from Europeans with 110 infections, or 14.4%.

Out of a total of 4,030 films in Africans, 1,062 showed parasites present, giving a percentage infection of 26.4. The different types of parasites were found in the following proportions.

Subtertian	...	...	...	...	97.5%.
Quartan	...	...	...	...	2.5%.
Crescents (in all slides)	...	...	...	...	.6%.
Crescents (in infected slides)	...	...	...	...	2.6%.

The spironemata of relapsing fever have not been seen.

Trypanosomes were found in three films, and in none of the cases was any clinical sign or symptom discovered which might lead to the diagnosis of sleeping sickness.

Microfilaria.—Twenty-one sheathed and eleven unsheathed—were found in .7% of all films examined.

Other examinations of blood include the usual total red and white counts (sixty-four), differential white counts (seventy), hæmoglobin estimations and blood cultures. There is little of interest to record in any of these.

2.—KAHN PRECIPITATION TEST.

The total of Kahn tests performed during the year was 417. In Europeans, seventy-eight with twenty-seven positive reactions.

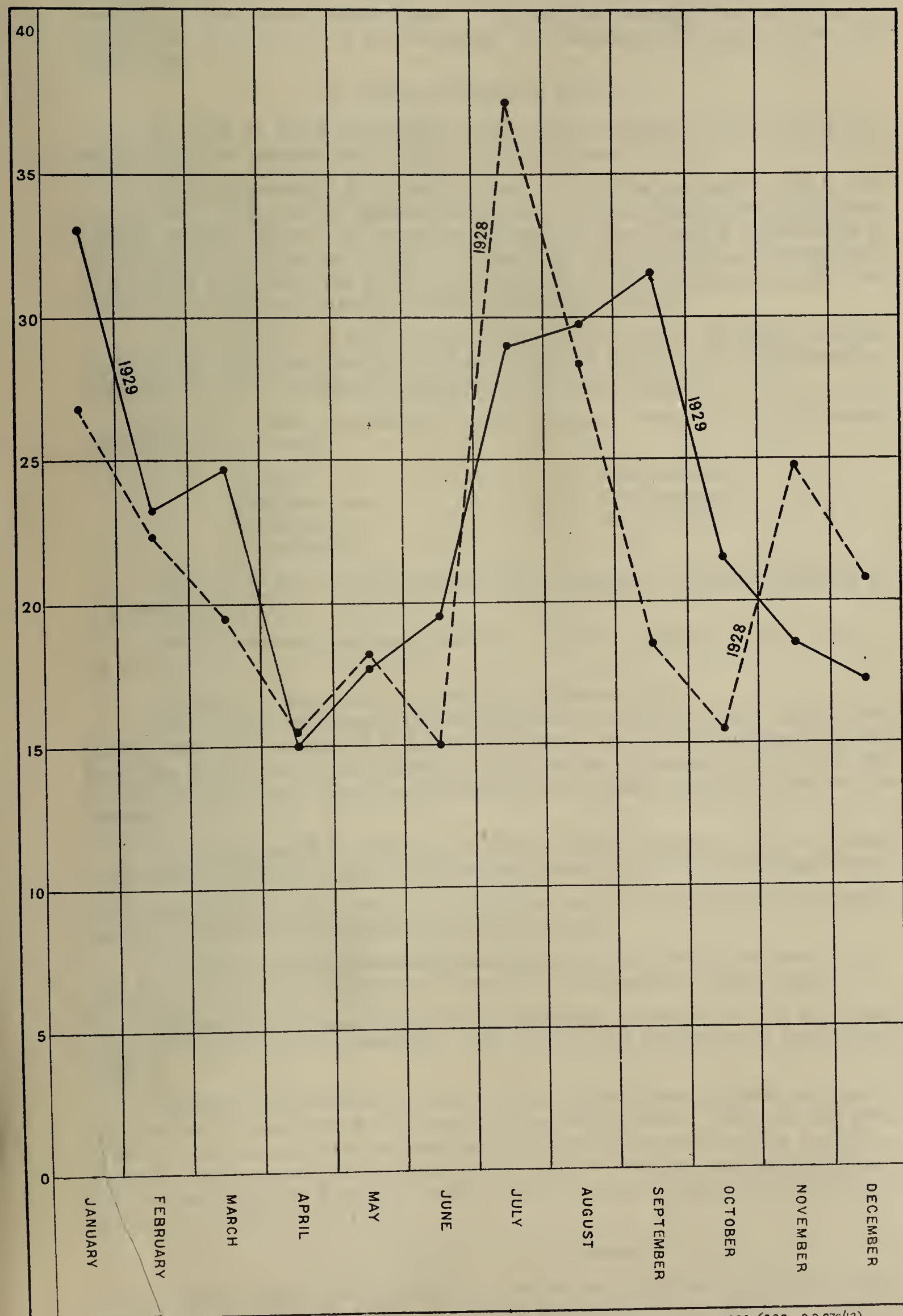
In Africans 339 with 215 positive reactions.

After considerable work on the Kahn test in this country, I can fully endorse my critical appreciation of this reaction in the Kaduna Laboratory report for 1927. It is sensitive, perhaps more so than the Wassermann, and this sensitiveness depends very much on the correct titration of the antigen. In connection with this I discovered only quite recently that the titration point of the antigen varies with the age of the antigen and in my opinion titration should be done once every three weeks. I never use an antigen more than two and a half months old. Whether this titration change occurs in the tropics only, I know not.

The following note I found in a medical pamphlet accords official recognition to the Khan test, and, I think, is worthy of repetition. "The value of the Kahn test for the diagnosis of syphilis is apparent

CHART N^o 1.

MONTHLY PERCENTAGE OF MALARIAL INFECTION IN SLIDES EXAMINED.



from the report of the Second Laboratory Conference on the Serodiagnosis of syphilis, organised by the League of Nations Health Committee. In comparison with other tests of international repute, the Kahn test stood out as a good method for the diagnosis of syphilis in the four criteria—practicability, specificity, sensitiveness and clear-cut reaction.

“ During the last few years the Kahn test has been attaining wider recognition, although, in view of the importance attaching to laboratory tests for diagnosis of syphilis, it is perhaps not unnatural that its general acceptance has been rather slow. The official recognition accorded to it by this Conference at Copenhagen will undoubtedly lead to its still wider use ”.

3.—EXAMINATION OF FAECES.

A total of 2,142 specimens have been examined, 373 from Europeans and the remainder—1,769—from Africans.

(a) *Europeans*.—*E. histolytica* were found in ten cases, and *E. coli* in eleven. The ova of ascaris and taenia were discovered, independently, in two cases. It surprises me that with so high a percentage of helminthic infection in the native the rate is so low in the European: one would imagine that both finger and fly in the kitchen would alter this state of affairs; happily, it does not seem to do so.

(b) *Africans*.—The accompanying chart shows the high rate of infestation with ova, and individual rates for ascaris and ankylostome. Figures are little changed from those of previous years.

In the 1,769 specimens from Africans over of the following helminths were found.

Ascaris	...	...	...	948 or 53.6%.
Ankylostome	...	...	...	719 or 40.6%.
T. dispar	...	...	...	648 or 36.6%.
T. saginata	...	...	...	15

Ova of ascaris, ankylostome, and T. dispar occurred together in 275 cases or 15.5%.

Ova of ascaris and ankylostome occurred together in 244 cases or 13.8%.

Flagellates were seen in 116 specimens or 6.5%.

Ova of *S. mansoni* are not common and were only found four times, and all in men. I have mentioned in previous reports from Kaduna how rare it is to find this infection in women, even in the Northern Provinces where schistosomiasis is more common than in the South.

Infection with *E. histolytica* shows a 20% increase; the free forms and cysts being found in thirty-nine and twenty-three times respectively.

Infection with *E. coli* is also higher and free forms and cysts were found in 125 and ninety-one cases respectively.

There is a definite seasonal incidence for *E. histolytica* and *E. coli* and I intend to work it out with accuracy during the coming year.

Blood and mucus were found together in about 4% of all cases. Cellular exudate in association with blood and mucus in 2.85% of all cases.

Bacillary Dysentery.—Twenty-four stools were plated; infection by Flexner Y occurred five times and by Shiga twice. Dr. Young who has been working during a considerable time of the year on the bacteriology of stools examined 153 specimens, and for further detailed information on this subject I wish to refer to the Annual Report of the Medical Research Institute for 1929.

4.—EXAMINATION OF URINES.

Almost treble the number of specimens have been examined this year as compared with 1928. As usual the results form a guide to treat-

ment for the clinician; apart from this the pathology and bacteriology of urine form a very dull chapter in any laboratory report.

A total of 1,664 specimens have been examined; from these fifty-two or about 3% came from Europeans.

Albuminuria with casts was found in 11.5% of native cases. Glycosuria occurred in ten cases.

So many of the specimens from African patients have a very small deposit, chiefly gonorrhoeal in origin, that traces of albumen are extremely common; apart from the figure of albuminuria given above, 30% of examinations showed the presence of this slight trace of albumen.

The ova of *S. hæmatobium* were found thirty times—twenty-seven in men and three in women; here again attention is drawn to the comparative rarity of infection in women.

Fourteen specimens were examined bacteriologically; the subsequent cultures showed little of interest.

5.—EXAMINATION OF SPUTA.

The sputa of all out-patients who reveal the slightest sign of a cough is sent for immediate examination in the Laboratory. Any case of pneumonic plague is thus immediately spotted and the confines of the hospital safeguarded from infection. During the present year only two cases of plague were discovered, both in the out-patient department.

The specimens examined were 477 of which thirty-two came from Europeans. Tubercle bacilli were found in the sputa of four Europeans and fifty-three natives. When the African does suffer from pulmonary tuberculosis, the bacilli of the disease are found in hundreds. There seem to be some authorities on tubercle who consider that the number (of bacilli), whether small or large, forms no criterion as to the seriousness of the complaint. I must admit that to myself there seems very little wisdom and less logic connected with such views. The African who suffers from tubercle does so in an acute form—acute compared with the European idea of tubercle—and post-mortem evidence agrees with both the clinical and pathological findings.

Miscellaneous.—Under this heading, as in previous years, there rests a 'pot-pourri' of examinations which individually have little or nothing of interest to record and collectively form a certain mass of material the examination of which is of importance to the clinician and even of interest to the patient. To the pathologist most are merely pus smears, and the repeated discovery of a certain diplococcus fails to become romantic. The plague authorities bring all smears for confirmation; these are not included in the total of 451 which represent an assorted collection which is common to every laboratory. It is quite unnecessary to mention them in detail.

6.—EXAMINATION OF TISSUES.

As in previous years, the greater part of section-cutting has been carried out in connection with post-mortem work. Of the 137 specimens of tissue examined, thirty-two came from the operating theatre.

The following list shows that most areas of the body have been, at one time or another, subject to microscopic examination.

Liver ...	...	30	Lung ...	...	8
Kidney	...	16	Intestine	...	8
Glands	...	16	Breast	...	7
Skin ...	...	14	Uterus	...	5
Spleen	...	10	Bones	...	5
Pancreas	...	4	Bladder	...	1
Cerebrum	...	3	Heart...	...	1
Thymus	...	3	Stomach	...	1
Parotid	...	2	Placenta	...	1
Thyroid	...	2			

Malignant disease was diagnosed in seventeen cases. The classification is as follows :—

<i>Carcinoma</i>	...	...	Breast	...	4
			Liver, primary	...	2
			Mouth	...	2
			Parotid Gland	...	2
			Bladder	...	1
			Uterus	...	1
<i>Sarcoma</i>	...	...	Breast	...	1
			Liver	...	1
			Tibia	...	1
<i>Lymphosarcoma</i>	...	...	...	...	2

Primary carcinoma of the liver is not uncommon in the confines of Nigeria. Each year in the laboratory reports there are two or more cases. In almost every case there is evidence of marked cirrhosis which may or may not result from such irritant sources as schistosoma and entamoebae. As some degree of cirrhosis is common in a large number of livers examined post-mortem, and where the search for evidence of schistosomiasis is negative, I am of the opinion that it is not at all unlikely other helminths (particularly the ankylostome) may be the cause of the above hepatic changes, and which are occasionally the precursor of malignancy.

The frequency of fatty livers in the native may be more physiological than pathological. Halliburton states that "fats are redistributed in the body in cases of infection and intoxication. Fat can be demonstrated in transit in the blood stream: there is enormous accumulation of fat in the liver in certain cases in which the rest of the body is greatly emaciated."

I hazard the statement that the natives of all tropical countries have at one time or another some form of intoxication subsequent to repeated protozoal and helminthic infection and for this reason fatty livers are much more commonly found in routine post-mortem examinations than they are in more temperate climes. Biochemical knowledge now slips in. 'It has been known for some time that animals with good reserves of glycogen in their liver, for instance after feeding with adequate amounts of carbohydrate, were more resistant than those with depleted stores to agents liable to cause liver intoxication and atrophy' (I quote from a recent leader in the British Medical Journal). More recently Minot and his fellow workers found that animals with a low calcium content were particularly susceptible to the poisonous effects of carbon tetrachloride and other drugs. And what is more important, that animals could be made very resistant even to large doses by feeding for a few days with a diet rich in calcium. This opens up immediately a whole field for interesting research in calcium therapy and its antagonistic influence upon both acute and chronic infections. In 1926 Dr. Butler drew attention to the dangers of carbon tetrachloride as an anthelmintic drug and one or two deaths were recorded as a result of its use. I was then in Kaduna where this drug was being freely used by the Medical Officer at the African Hospital and with no apparent ill effects. I suggest that an explanation for the different action of carbon tetrachloride on northern and southern natives might be reasoned from a dietetic point of view. The southerner takes much fat in his daily diet, chiefly in the form of palm oil. The northerner's diet is low in the intake of fat: he is, therefore, and solely from a physiological point of view, much less likely to absorb lethal doses of the drug.

7.—POST-MORTEM WORK.

As I have stated in an earlier section of this report, post-mortem examinations are no longer done in a routine manner; the total number has thus dropped and incidentally caused a relative increase in the number of deaths from unnatural causes. In paragraph (b), respiratory diseases still maintain first place on the list of killing diseases, with tuberculosis second. A total of 172 post-mortem examinations was made. They are classified below under suitable headings.

(a) Deaths from unnatural causes : 44 or 25%.

(1) Injuries—accidental in 12; homicidal in 3.	
(2) Burns	2.
(3) Poisoning	2.
(4) Drowning	25.

(b) Deaths from natural causes : 128 or 75%.

(1) Respiratory diseases (excluding tubercle)	28
(2) Tuberculosis (various forms)	16
(3) Abdominal diseases (other than dysentery)	14
(4) Circulatory system diseases	11
(5) Plague	8
(6) Dysentery and diarrhoea	6
(7) Nephritis	6
(8) Sepsis	6
(9) Malignant disease,	5
(10) Central nervous system diseases	4
(11) Genito-urinary (other than nephritis)	3
(12) Marasmus, starvation and senility	3
(13) Various	6
(14) Unknown (including found in the sea)	12

INTERESTING POST-MORTEM CASES.

1. *Plague*.—There were no cases discovered after death in the hospital mortuary; those in the list above were found during work in the public mortuary, and practically all were Coroner's cases.

2. *Tuberculosis*.—A total of sixteen cases, which however, compared with numbers in previous years, shows relatively the same percentage. Tubercle is of peculiar interest in the African: it is at once a semi-acute disease, and there would seem to be very little of the chronic joint or indeed pulmonary type so common in colder climates. In nearly all the above cases examination shows a considerable spread of the infection from the apparent primary focus. Sometimes it seems difficult to understand the way in which groups of organs are affected without any particular reason for such association. For example, in a child of ten years there was found at the autopsy a well-marked Tuberculous colitis affecting the whole of the large intestine with very slight implication of the mesenteric glands and a miliary condition of the spleen: sections of all the other abdominal viscera showed no sign of Tubercle, neither was there any sign in the chest.

Tubercular Pericarditis.—There have been three cases during the year.

(1) A man aged about twenty-six years was found dead. The pericardial sac was much enlarged, thickened and with the fluid turbid and milky. There seemed no sign of tubercle in the myo—or endocardium. The right side of the chest was apparently normal: in the left chest the lung was collapsed almost to nothing and the space filled with a large pleural effusion. When this was removed the whole of the left pleura was seen to be covered with tubercles, which extended over the left half of the diaphragm. The mediastinal glands were a little enlarged, but not caseous: and the only other sign of tubercle in the whole body was in the mesenteric glands which were enlarged and caseous.

(2) A young man died in a plague area and an autopsy was performed. There was no sign of plague. When the chest cavity was opened the heart and its coverings were immensely enlarged. The pericardial sac was opened and contained nearly two pints of flaky serous fluid; the sac was thickened to the extent of half an inch in places and the inner surface revealed many tubercles. The external surface of the heart was very rough and shaggy. When dissected in the usual way to demonstrate the cardiac chambers, a warty outgrowth was discovered in the middle of the left ventricle; this was cut and the stained section

showed typical tubercular granulomatous tissue with giant cells in large numbers. The left lung was partially collapsed; there appeared to be no sign of tubercle in either the right or left lung. The abdominal viscera were unaffected, and only the mesenteric glands showed tubercular infection. To all intents and purposes the infection would seem to be a primary one in the heart.

(3) The infection of the pericardium in this case was comparatively early and the gross pathological changes were not nearly so marked as those described in the two previous cases. The patient, a man of thirty, showed evidence of tubercle almost everywhere in both thorax and abdomen: the pericardium merely became involved in the general display.

3. *Circulatory System*.—No case of malignant endocarditis can be recorded for this year.

Cardiac Aneurysm.—A big well made coast boy was brought into hospital after he had just died: according to his friends, he was at his work, suddenly collapsed and complained of agonizing pain over his left chest. He was dead in a few minutes. On examination the heart was found to be much enlarged; the pericardium was cut, and out flowed recent blood clot and sero-sanguinous fluid. Further findings showed a small sacular aneurysm arising at the very base of the aorta; the wall of the aneurysm sac was extremely thin, and this had ruptured; hence the sudden hæmorrhage into the pericardium—and death.

4.—*Renal Disease*.—I have seen no case of acute nephritis and there is no record of the disease for this year. Dr. Butler in the 1927 report draws attention to the same fact. If cold is a predominating factor in the aetiology of the disease, there seems to be no adequate reason why the acute condition of Bright's disease should not occur during the months of July and August when the temperature in Lagos drops considerably.

5. *Malignant Disease*.—In the Lagos Laboratory Report for last year (1928), a case of carcinoma of the pancreas in a European was recorded. I performed the post-mortem examination, proceeded on leave soon after and the writing of the report was in other hands. The impossibility of writing up cases which have not been seen personally allows me the excuse for writing about this case now, and in particular comparing it with what seemed a similar condition in a native and falling into a well-designed trap. The European, a male aged forty-nine years was admitted into the European Hospital in Lagos with severe lumbar pain, restlessness and slight cyanosis. There were large subcutaneous hæmorrhages in the lower abdomen, sacral region, arms and legs. A Widal reaction proved negative; examination of the blood gave no very definite information; the stools contained a large amount of fat. Breathing was rather difficult and auscultation produced indefinite signs. Dr. Gray considered the possibility of malignant disease of the lung, and I suggested acute pancreatitis. The patient was more than well covered and showed no external evidence of malignant disease. He died within three weeks, and I may mention here, with no sign of jaundice. An autopsy was held. Purpuric areas present on forearms and lumbar region; no jaundice or oedema. Examination of the head was negative. The heart and large vessels normal. Both lungs in an apparent stage of red to grey hepatisation, but not typical of a pneumonic condition: a considerable amount of fibrous tissue split up the lung substance into a small mosaic pattern: the pleurae were neither inflamed nor thickened.

Abdomen.—Excess of fat in the omentum, but no fat necrosis. the inferior surface of the stomach adherent to pancreas: one area (stomach) about the size of a florin thickened and hard; did not extend to mucosa. The duodenum was adherent to the pancreas, but no sign of infiltration. The liver pale in colour with no apparent secondary deposits and gall bladder normal. The head and body of the pancreas acutely hæmorrhagic: areas of new growth in head and body. The spleen was slightly enlarged with no deposits of growth.

The retroperitoneal glands were hard and enlarged, hæmorrhagic and infiltrated with growth. Sections of the pancreas showed a carcinoma of the parenchyma; the lungs and retroperitoneal glands were full of secondary deposit. There was no evidence of infiltration in the liver, spleen, stomach and duodenal walls or small cervical glands.

Now comes the second case, which for want of more ingenious nomenclature, I will label "malignant mimicry", and both Surgeon, Physician and myself were deceived by the art of nature. A native of the Southern Provinces was brought into the African Hospital in a moribund condition: he died shortly after admission. The body was rather emaciated and the abdomen a little distended. The heart was small with a few arterio-sclerotic patches in the first part of the aorta. There was a feeling of 'hardness' throughout the substance of both lungs: the mediastinal and sublingual glands were enlarged, hard and white on section.

In the abdomen were about one and a half gallons of clear serous fluid: the peritoneum showed no signs of inflammation. The lower part of the stomach wall and the duodenum were adherent to the pancreas. The upper part of the small intestine contained a large number of ascaris. The liver was cirrhotic with no sign of secondary deposits. The head of the pancreas was one solid mass of apparent growth which was almost scirrhus in nature: spleen enlarged and appeared to be full of secondary deposits. The mesenteric glands were enlarged and microscopically infiltrated with growth. Sections of the above organs and glands showed gumma throughout, even to the lungs, and this extraordinary simulation of malignancy in both appearance and disposition exhibits a picture which must surely be rare in pathological annals.

6. *Intestinal Disease*.—One case of intestinal schistosomiasis is of sufficient interest to record. A southern native was admitted into the hospital with diarrhoea; routine pathological examination exhibited the presence of *S. mansoni* and *S. hæmotobium* in his stool and urine respectively.

Three days later he suddenly collapsed with all the signs of internal hæmorrhage and very shortly afterwards died. Post-mortem examination showed a body poorly nourished and with the following morbid changes. The whole of the large intestine was greatly distended and contained almost pure blood: the walls were thin, being devoid of a considerable amount of the musculature: what remained of the mucosa and sub-mucosa was ragged and of a dark-blue colour. The rectum was intensely congested. *Bilharzia* ova were found from cæcum to anus; there was no sign of entamoebæ in smears or sections and cultures were negative for the dysentery bacilli. Congestion and small ulcerated areas in the bladder marked the outward signs of schistosomal infection and the ova were found in large numbers. The liver was enlarged with a patchy peri-hepatitis, yellow-green in colour and on section showed the typical picture of a multilobular cirrhosis—a common and almost invariable sequela to bilharzial infection. The case is of interest, because of the vast intestinal destruction which eventually caused a fatal hæmorrhage and death: also, because of the absence of any external sign of schistosomiasis so advanced in its course.

(b) *Traumatic rupture of the small intestine*.—A well-developed coast boy of twenty-nine years was admitted into hospital as a result of an accident on board ship the previous day. He had fallen rather heavily and struck his abdomen with some force against an iron stanchion. He died soon after his entry into the ward. An autopsy was done. Externally there were no signs of any injury (it must be remembered that bruising is practically impossible to detect in a black skin): the subcutaneous tissues of the middle of the abdomen showed considerable ecchymosis—also in the rectal muscles. There was no free fluid in the abdomen: the peritoneum was injected and inflamed in patches.

above the umbilical line. Two perforations were found : the first at the duodeno-jejunal juncture and about quarter inch in diameter : the other two feet down the jejunum and about half inch in diameter.

Both the large and small intestine showed many intensely injected areas. Ascaris worms were found in moderate numbers. How far were they mechanically responsible as the cause—or additional cause—of the ruptured intestine?

7. *Sudden death in Children*.—I have to record three cases under this heading. The only adequate cause of death in all was a very marked enlargement of the thymus gland.

In conclusion it is my pleasure to appreciate the courtesy of the Director of the Medical Research Institute for much help in many ways; and acknowledgment to the Rockefeller Yellow Fever Commission for numerous kindnesses.

HENRY MORRISON,
Pathologist.

APPENDIX D.

ANNUAL REPORT ON THE
PATHOLOGICAL LABORATORY, KADUNA, 1929,
BY
W. E. McCULLOCH, M.D., CH.B.
Pathologist.

ANNUAL REPORT, 1929—THE PATHOLOGICAL LABORATORY KADUNA.

1. *Buildings* have remained unchanged since the inception of the Laboratory. The much needed enlargements have not been carried out, and the discomforts pointed out by my predecessor in 1927 still maintain. That report stated that a room for the Pathologist was soon to be erected. It has not yet been started.

It has been agreed that the mortuary should be modernised and that a laying out chamber should be added. An animal house is to be built, as under present conditions no inoculations can be carried out.

2. My thanks are due to the Director of the Medical Research Institute for much help in the supply of various rare chemicals. The Rockefeller Yellow Fever Commission have been also very generous.

3. The various Medical Officers in charge of the Kaduna Native Hospital supervised the work of the laboratory until the arrival of myself on April 26th of this year.

(b) Second-class Laboratory Attendant, James Tugele and Third-class Laboratory Attendant, O. I. Oyoyo have worked in the laboratory throughout the year.

It is a great pleasure to be able to acknowledge the enthusiasm of these laboratory attendants, their active desire to learn, and their aptitude at their tasks. The senior of them, James Tugele, was found to be astonishingly skilled at his work, and I. Oyoyo has made steady progress throughout the year. The introduction of some biochemical work demonstrated the necessity of a course of chemistry for laboratory attendants to which, must be added some teaching in simple arithmetic in which they are very weak.

4. The work of the year may be divided into four divisions:—

- (a) Examinations carried out for out-stations.
- (b) Routine examinations for the African and European hospitals in Kaduna.
- (c) Special examinations as they arose.
- (d) Research in animal nutrition.

Early in June the Pathologist issued a circular letter to all Medical Officers in Northern Nigeria, as only thirty-four specimens had been received in the previous year from the twenty Medical Officers of the Province, it was obvious that the facilities of the laboratory were not being used as they might be. The letter had an immediate effect. In June, thirty-seven specimens were received, and this number has been more than maintained since. The material sent in for examination is chiefly for serological diagnosis, and the histological report on tissues removed at operation or post-mortem. While the increase of material is comparatively so vast, as this year there have been 301 specimens received, it cannot yet be regarded as satisfactory. The service to out-stations will, I trust, grow, and this must depend on how useful the Pathologist proves to be to his colleagues in the hospitals.

Undoubtedly transport difficulties are inhibitory of sending in material, but if the work in this laboratory proves helpful, the practice will grow. One signal effect of the increased material for histological report, has been the realisation that malignant disease is by no means as rare as it is thought to be by some writers on tropical medicine.

(b) The laboratory is used as the clinical side room of the Kaduna Hospitals. With the increase of out-station material, and the desire of the Pathologist to attempt some research, it was arranged that the routine examination of the urine and blood of all out-patients at the African Hospital should cease. This system had been in vogue for two years. The collection of large totals of the incidence rate of parasitism is of undoubted value, but the figures are incomplete, and can actually be misleading, when faecal examinations are not also included. It was

obvious that there was no time to do all three, nor would the natives have submitted to it. As a result of the work on these lines for two years valuable statistics have been collected, and are recorded in the two previous annual reports of this laboratory, so, presumably, the original intention has been carried out.

Examinations are of course carried out in every instance where the officers in charge of the hospitals request them, but as research grows and out-station material increases, the routine will still further be decreased with the cordial support of the officers concerned. It is a great pleasure to acknowledge the close co-operation that has all along existed between the native hospital and the laboratory. Dr. G. M. M. Menzies, Medical Officer and Dr. E. C. Braithwaite, Specialist, have been of great help to me in problems that have arisen in the laboratory, and they have constantly asked me into their wards.

(c) SPECIAL EXAMINATION.

(i) *Bilharziasis.*

The vesical form of this disease is endemic in the Kaduna area. It was thought advisable to examine snails from the dam in the public gardens at Kaduna. This dam is fed by so small a stream that the overflow is barely perceptible, so that the water was almost stagnant.

Three varieties of cercariae were found, all were distomata and leptocercus and microcerus varieties were very numerous. There were a few furcocercus varieties also found. As the fork tailed cercariae had no pharynx and were covered anteriorly with spines, they were certified to be cercariae of schistosomidae (Brumpt). Further as *S. hæmatobium* is endemic in the area's native population, it was assumed that they belonged to this species.

Major Connolly of the British Museum, through the good offices of Dr. Bayliss, identified the snails as *lymnaea elmenteitensis* (Smith) and *planorbis ? tamsianus* ("Dhr", Class).

The furcocercus cercariae were found in *planorbis*. The pool behind the dam was drained and thoroughly cleaned and desiccated.

(ii) *Milk.*

A sample of milk from a native cow kept by a European was analysed.

Fat	...	...	...	...	...	5.8%.
Total solids	...	...	...	...	...	13.6%.
Non-fatty solids	...	...	...	...	...	7.8%.

No *B. coli* or tubercule bacilli were present. No intestinal pathogens or urea was found. It was a very fine milk.

A second sample was presented a few months later. As it contained 0.5% urea or about 25% added urine, the examination was not carried further.

These examinations are of great interest as they show the necessity of constant European supervision to obtain a clean milk in this country. With the inevitable slackening off of supervision the native cattle man returns to his habits in collecting the milk (washing the cow's udders with urine is one) and the supply again becomes extremely dangerous.

One herdsman quite frankly tells Europeans that if they want unwatered milk they must pay penny per pint more than the normal price. Even so, a sample of the "pure" milk contained 12.4% (by calculation) of added water, but fortunately, no urea. No pathogens were isolated from this milk. As normal market milk contains about 50.5% added water it would appear much the wisest course for Europeans to remain faithful to the tinned varieties.

(iii) *Water.*

A sample of soda water made in Kaduna was submitted for examination, as apparently a mouthful of it caused violent diarrhoea in a European.

It had an offensive, fæcal odour, especially when warmed, and there were particles of earthy matter, visible to the naked eye, in the bottom of the bottle. On culture no *B. coli* or intestinal pathogens were isolated. A heavy crop of spores were found in the broth culture. These proved to be the spores of *Clostridium spermoides* (Bergy *et al*) on further anærobic culture. This organism is listed as being an inhabitant of soil and being non-pathogenic. The absence of laboratory animals prevented any attempt at proving that this organism was the causative agent of the violent diarrhoea which cleared up in twenty-four hours.

When a Medical Officer, I was often struck with the apparent lack of cause of these twenty-four hours diarrhoeas in Europeans.

The more experienced in the country of my patients always blamed the "filter water", but I could find no cause there. It would appear that it would be well worth while to attempt to trace these diarrhoeas to this organism, as the average filter candle in Nigeria is as good a centre of bacterial activity as the bacterial filter of a sedimentation tank elsewhere.

Clostridium spermoides was also eventually recovered from a sample of tap water, which is merely the waters of the Kaduna river pumped direct into the mains that supply the station.

(iv) *Native Drugs fed to Europeans.*

In co-operation with the Police Intelligence Bureau an academic inquiry was started into the various charms for invisibility, inducing heavy sleep, etc., used by the criminals of the country. It is hoped soon to induce a renowned criminal to try his practiced hand on the Pathologist, when it is hoped that some valuable notes will be made. From identification of the materials used in preparing these charms and drugs it would appear that the whole system is based on sympathetic magic, accompanied by much suggestion.

On three occasions a mixture was submitted which it was alleged was being administered to various officers in order to get them to grant favours, such as not dismissing a servant, engaging a particular boy, etc. The mixture consisted of gum acacia, very fine sand and the pith of a plant. As alcoholic solution gave a red colouring matter (from the picked out pith) it is probable that the pith was that of the guinea corn stalk which contains a red anthocyanin. Samples of other materials administered to Europeans one in porridge and one in a pudding, were submitted to the Government Analyst who could detect no poison in them. They were therefore probably of the same class as the first set of samples, to induce goodwill.

(v) *Helminths.*

Dr. H. A. Bayliss of the British Museum has very kindly identified the following species during the year:—

- (1) *Loa-loa* ♀ (Guyot 1778). From peritoneal cavity of a man operated on for hernia by Dr. G. M. Menzies.
- (2) *Physaloptera?* *quadrovaria* (Lieper, 1908). Gut of tree snake not yet identified.
- (3) *Physaloptera quadrovaria* (Lieper, 1908). Oesophagus of monitor.
- (4) *Polydelphus anoura* (Dey, 1845). Gut and lungs of a python.
- (5) *Kalicephalus?* *Nigeriensis* (Orlepp, 1923). Same site as No. 2.
- (6) *Raillientina insignis*. Gut of domesticated pigeon.
- (7) *Mermis* ♀ *sp.* (Immature). Under a stone in native kitchen.

Dr. Bayliss has generously offered to have a small collection of snakes named and returned for museum purposes. My best thanks are due to the Europeans of Kaduna and Kakuri who have been to some little trouble to preserve those killed in their compounds.

The collection so far includes black mambas—one killed in a fowl house. A python ten feet long—shot on a verandah when killing a cat. A large echis—four feet one inch long, and several varieties of tree-snake. No parasites have yet been seen in the blood films made from these reptiles.

The smaller *Polydelphis anoura* were found with their heads buried in the lumen of a large tumour mass in the gut.

Dr. Bayliss reports that this tumour, which I thought might be a diverticulum of intestine enormously hypertrophied, probably originated as a cyst formed by some other parasite, or possibly an abscess, and seems to have an opening into the lumen, through which the Ascarids (as is their common habit with any small orifice) had inserted their heads. I do not think that it was caused by the Ascarids themselves.

The mermis was eighteen inches long, and as it was immature it had recently emerged from some insect under the floor of the kitchen. This seems astonishing to my inexperience as the worm was really bulky.

It is pointed out that the type host of *Physoloptera quadrovaria* is a monitor, and that it is of interest to recover it from a tree-snake as well.

(vi) *The Kahn Test.*

My predecessor, Dr. H. Morrison, has given an excellent review of the work done on this precipitation test for syphilis. In the 1928 report from this laboratory it is reported that the positive results obtained with the Kahn Test in that year were only 25% of all sera examined in the latter half of the year, while the Sachs-Georgi had given 61% of positives in the previous half year.

As syphilis and yaws do not have such a marked seasonal incidence as this, it was determined to examine into the cause of the anomaly. For this purpose all sera submitted to the laboratory since the first of July have been submitted to the Kahn and Sachs-Georgi tests. Without analysing the figures at present they may be shown here.

KAHN TEST 1ST JANUARY, 1929 TO 30TH APRIL, 1929.

No. of Sera	...	...	211	
„ Positive	...	...	77	(Quantitative results are valueless as all are shown as three or four pluses, never less).
% Positive	...	...	36	

On my arrival this test was stopped and the Sachs-Georgi alone substituted.

SACHS-GEORGI TEST 1ST MAY, TO 30TH JUNE, 1929.

No. of sera	...	...	...	...	78
No of positive	...	...	...	...	46
Percentage of positive	...	...	...	...	59.0

which shows an improved figure for the Kahn Test and a practically constant figure for the Sachs-Georgi Test as compared to the 1928 figures.

For the third series the Kahn Antigen was re-titrated frequently and the results compared to the Sachs-Georgi.

1ST JULY, 1929 TO 31ST DECEMBER, 1929.

			Kahn.	Sachs-Georgi.
No. of Sera	...	...	373	373
„ Positives	...	...	206	207
% Positive	...	...	55.2	55.5

This agreement appears remarkable but it is only apparent and not real. When the figures are analysed elsewhere it will be shown that the Sachs-Georgi is *less specific* than the Kahn, as many of the very weak positives of the Sachs-Georgi were given by sera of cases suffering from malaria and trypanosomiasis.

Agreement in the clinically specific cases was very close. The results are conclusive that the Kahn test loses its specificity in the tropics (as noted by all other workers), but experience here differs as to the cause. All alcoholic extracts evaporate rapidly in the tropics, and it is due to the *concentration* of the antigen that its specificity is lost. We are still using antigen made in this laboratory in 1928, and it now gives excellent results because it is re-titrated every month. The antigen which caused a decrease of over 50.0% in the positive serum reactions now agrees very closely with the Sachs-Georgi results, because it has been diluted to the strength recommended by Kahn. The agreement of the percentages of positives in the second and third series of tests was, of course, proof that the anomalous results of 1928 were due to concentration of the Kahn antigen without this factor being suspected. As the rainy season was about equally divided between the two tests the incidence of severe infections of malaria was discounted in either experiment. It is hoped to present these results in a less general form elsewhere.

(vii) *Neoplastic Diseases and other Tumours.*

The following were histologically diagnosed during the year.

Adenoma of thyroid	...	...	...	...	...	1
Colloid vesicular goitre	...	...	...	...	...	1
Carcinoma (one of liver and one of pancreas)	...	...	...	...	...	4
Angioma	...	...	...	...	...	1
Cyst-adenoma	...	...	...	...	...	1
Dermoid	...	...	...	...	...	2
Epithelioma	...	...	...	...	...	2
Squamous epithelioma	...	...	...	...	...	1
Plexiform endothelioma	...	...	...	...	...	1
Fibroma	...	...	...	...	...	8
Myxo-fibroma	...	...	...	...	...	1
Fibro-myoma	...	...	...	...	...	1
„ -epithelioma	...	...	...	...	...	1
Gumma-cord	...	...	...	...	...	1
„ liver	...	...	...	...	...	1
„ testicles	...	...	...	...	...	5
Lymphoma	...	...	...	...	...	2
Angio lymphoma	...	...	...	...	...	1
Melanoma	...	...	...	...	...	2
Neuro-fibroma	...	...	...	...	...	1
O. volvulus	very many—ceased to section them.					1
Rodent ulcer	...	...	...	...	...	1
Sarcoma, melanotic of spleen	...	...	...	...	...	1
„ (dermoid)	...	...	...	...	...	1

Very few of the malignant neoplasms were received from Kaduna, but they included the carcinoma of the liver, and an epithelioma of the lip.

My thanks are due to most of the doctors in Northern Nigeria for the material from which these diagnoses were made. Dr. Caffrey of Maiduguri is indefatigable in sending material, and all has been of very great interest.

There can be no doubt that malignant disease is more prevalent than has been supposed in the past. An interesting observation has been the comparatively high incidence of gummata of the testicle which have been removed at operation. It appears that gummata are more frequent in occurrence than tubercular or gonococcal infections at time of operation. Only one tubercular testicle has been received out of a series of eight.

POST-MORTEM EXAMINATIONS.

(viii) *Only twenty-eight post-mortem examinations were performed as compared to forty in the previous year.*

The causes of death were as follows :—

Beri-beri, wet	...	...	...	...	...	1
Blackwater fever	...	...	...	...	...	1
Carcinoma of liver	...	...	...	...	...	1
Cerebro-spinal meningitis	...	...	...	...	...	1
Carcinoma of pancreas	...	...	...	...	...	1
Colitis after hysterectomy	...	...	...	...	...	1
Chloroform poisoning	...	...	...	...	...	1
Empyema	...	...	...	...	...	1
Pelvic peritonitis after labour	...	...	...	...	...	1
Pneumococcal broncho-pneumonia	...	...	...	...	...	2
„ lobar- „	...	...	...	...	...	3
„ Meningo-encyphalitis	...	...	...	...	...	3
Septicaemia	...	...	...	...	...	1
Senile decay	...	...	...	...	...	1
Trypanosomiasis	...	...	...	...	...	1
<i>Deaths by violence</i>	...	...	...	...	...	6
Fracture of fourth cervical vertebra	...	...	...	...	...	1 (fall).
Fractured skull	...	...	...	...	...	1 (train).
Ruptured liver	...	...	...	...	...	1 (explosion).
Gun shot wound	...	...	...	...	...	1
Ruptured hernia	...	...	...	...	...	1 (blow).
„ amoebic abscess	...	...	...	...	...	1 (blow).
Pulmonary embolism after operation	...	...	...	...	...	2
Total ...						28

The only cases calling for comment are the wet beri-beri, the carcinomata, and the pneumococcal meningo-encephalitis. The sections of the beri-beri case have not yet been studied and they will be reported upon in the near future.

The pneumococcal infections were missed during life. Clinical experience has been borne out in that it is unsafe not to examine the cerebro-spinal fluid of all native Africans who show meningeal or cerebral symptoms, no matter how high the fever may be. Temperature alone does not affect the Africans cerebration as it does that of the European.

The carcinoma of the liver was found at post-mortem examination before my arrival. There is no record of any primary focus, but the notes state that right kidney, pancreas and spleen were adherent to the liver.

The second case came into hospital complaining of difficulty in micturition. Two days later complete paralysis developed up to and including the bladder. Death took place five days later. The pancreas adhered to the stomach and it was hard and “shotty”. The whole head of the pancreas was replaced by an enormous scirrhus carcinoma, but the stomach was only involved in the adhesions no new growth being apparent. The liver was very enlarged and deeply congested and fibosed. No secondary deposits apparent to the naked eye. Both kidneys are very enlarged, and there are literally hundreds of metastases in each organ. The retro-peritoneal glands are all greatly enlarged and deeply infiltrated with new growth. There was no erosion of the vertebrae. The cord was compressed at the level of the first and second lumbar vertebrae by a small secondary deposit arising from the body of these vertebrae, and involving the inter-vertebral disc. With such widely generalised cancer it is astonishing that this man, a soldier, was actually, sufficiently fit to be on parade a fortnight before his death.

(ix) Dietetic Research.

(a) A group of ninety prisoners in the Kaduna Gaol have been prepared for feeding on experimental dietaries with a view to proving the deficiencies that exist in their present food. The infection rate with *Ent. histolytica*, intestinal helminths, urinary schistocomiasis and gonorrhoea has been high.

Dr. G. M. M. Menzies has kindly treated all cases found infected, so that the group may now be taken to be fairly clean at the inception of the dietetic experiments.

(b) Co-operation has been established between the Pathologist and the Sheka Experimental Farm of the Agricultural Department near Zaria. Mr. A. W. Anderson, the Superintendent in charge, has kept me supplied with urine and blood which have been analysed as shown in the accompanying table. It appears that there is no such thing as a constant in the composition of the blood of Nigerian cattle. I have since learnt that the wide variations in the blood contents of British cattle also precludes any figures being regarded as normal. The outstanding facts to be derived from the experiments are that the contents of chloride and calcium can be increased by feeding these salts, and that the protein intake is very low. As the chlorides and calcium are increased in the blood upon ingesting these salts, it seems a fair inference that the animals were, or are still, deficient in their intake of these salts.

The high percentage of carbon dioxide evolved from the urine of these animals, and the constant alkalinity of all samples, cannot be interpreted as the tables show that all animals were not being fed "Kanwa" which is, of course, a mixture of the carbonates and bicarbonates of sodium and potassium. It may be "constitutional" in cattle, but I do not know. The extremely low urinary chlorides are noteworthy. Only group V. who are being fed rock phosphate, wood ash and salt show more than a trace of chlorides. Group I. which also receives salt but in a mixture with "Kanwa" show only such small traces of chloride excretion that it could not be estimated. Presumably this means that the animals were so depleted of chlorides before the start of the experiment that twenty-seven days feeding of chlorides still prevented any of it being in excess of the animals needs.

All results are complicated by the fact that some of the animals were in calf, and others were giving varying quantities of milk. It is an interesting but unexplained fact that cow No. 5 (saige), which gives a very heavy deposit of albumose in the urine, gave birth to a calf which is a cretin. He is now six months old, and is not equal in development to the average calf of two months of age.

No attempt at detailed examination of the results can be attempted as these experiments were loosely designed merely to try and see if any deficiencies do exist. They have served their purpose in showing that the intake of protein, calcium and chloride will have to be investigated, and with these will have to be taken the question of phosphorous metabolism as well.

Statistical.

A. AGGLUTINATION TESTS.

WIDAL TEST.

Total Test	=	18.
Africans ...	10	
Europeans ...	8	

There were two Africans positive to Para-Typhoid B.

There was one European " " " " A.

There were two Africans " " Typhoid.

Bacillary Dysentery Test (Shiga and Flexner).

Total Test	=	5.
Africans	3	
Europeans	2	

One African was positive for Flexner and the organism was recovered also from the faeces.

B. SPUTUM EXAMINATION.

Total Sputa examined	=	193.
Africans	...	167
Europeans	...	26

			Africans.		Europeans.		Total Infection.
Tubercle bacilli	...	...	17	...	Nil.	...	17
Bronchial spirochætes	...	...	3	...	4	...	7
Micro-catarrhalis	...	...	5	...	Nil.	...	5
Staphylococci	...	...	7	...	4	...	11
Streptococci	...	...	1	...	6	...	7
Pneumococci	...	...	4	...	4	...	8
			<hr/> 37	...	<hr/> 18	...	<hr/> 55 or 28.4%

Sundry Findings.—Two cases showed elastic tissues one of which include giant cells. Both in Africans.

Another showed diptheroid in a European. Also eosinophilie diplococci in three Europeans and pus in two. One African also showed pus.

C. FAECES EXAMINATION.

Total Examination	=	1,627.
Africans	...	1,567
Europeans	...	60

			Africans.		Europeans.		Total Infection.
Ent. histolytica	...	...	50	...	Nil.	...	50
Ent. hist. cysts	...	...	284	...	6	...	290
Ent. coli cysts	...	...	38	...	3	...	41
Iod. butschlii	...	...	6	...	Nil.	...	6
Ankylostoma duodenale	...	...	222	...	Nil.	...	222
Ascaris lumbricoides	...	...	61	...	Nil.	...	61
Taenia saginata	...	...	45	...	1	...	46
Schistosoma mansoni	...	...	19	...	Nil.	...	19
Trichocephalus dispar	...	...	27	...	1	...	28
Blood	...	...	167	...	12	...	179
Mucous	...	...	128	...	4	...	132
Pus	...	...	16	...	Nil.	...	16
Blast. hominis	...	...	2	...	Nil.	...	2
			<hr/> 1,065		<hr/> 27		<hr/> 1,092

D. BLOOD EXAMINATION.

Total Blood Slides examined	=	2,444.
Africans	...	2,152
Europeans	...	292

	Africans.	Europeans.	Total Infection.
Subtertian	326	70	396
Haemoglobin % = 477 (Tallqvist's is in common use but in special cases Colorimeter was used and the Haemoglobin expressed in grams per 100 c.c.)			
Colour Index	...	7	
Differential Count	...	221	
Total Blood Count	...	29	
Red „ „	...	1	
Filaria Perstans	...	9	
„ Loa loa	...	1	
Tryp. Gambiense	...	3	

E. FLOCCULATION TESTS.

Already reported.

F. URINE EXAMINATION.

Total Examination	=	1,081.
Africans	...	965
Europeans	...	116

	Africans.	Europeans.	Total Infectio.
Albumin	190	39	229
Bile	8	15	23
Blood	103	19	122
Casts	7	2	9
Gonococci	18	—	18
Pus	128	19	147
Staphylococci	35	8	43
Streptococci	3	4	7
Spirochaetes	1	—	1
Sugar	5	3	8
Urobilin	—	2	2
Ent. histolytica	2	2	4
Bacillus coli	5	6	11
Cocci	5	2	7
Chloride	2	—	2
Diplococci	2	2	4
	514	123	637

The finding of *Ent. histolytica* in urine had only occurred once in my experience and that was six years ago. In all cases prompt recovery from an intractable cystitis was obtained by emetine injections. The cases of the Europeans call for some comment. The first case was that of a female who was four months pregnant, and she was slowly sinking until active amoebae containing red corpucles were found in the urine. Her medical adviser informed me that after the first injection of emetine her condition improved "hourly". The second case was a male who has been under treatment by Specialists at home and largely by himself in Nigeria, for a gonococcal urethral chronic abscess for eleven years. Cysts were found in his septic urine on the first examination. All irritation passed off after the second injection of emetine.

As he is being given the full course of injections his case is not yet finished with, but he considers that he is already cured.

The results of emetine treatment in the African patients were equally dramatic. It would appear that *Ent. histolytica* is more amenable to treatment in the bladder than in the gut.

All cases have been eminently successful.

G. 155 sections were prepared and histologically examined during the year.

MISCELLANEOUS EXAMINATIONS, 1929.

Examination.	Number.	Finding.	Number.
Nasal smear ...	10	Lepra bacilli in ...	3
Urinary deposit ...	129	Staphylacoccus in ...	25
" " ...	—	Streptococcus in ...	2
" " ...	—	Gonococcus in ...	14
" " ...	—	B. coli in ...	4
" " ...	—	Gonococci in ...	7
" " ...	—	Yeast dipthoid in ...	6
" " ...	—	E. hist cyst in ...	2
" " ...	—	Casts in ...	1
Urethral discharge ...	44	Schistosoma hæmatobia in ...	3
" " ...	—	Gonococcus in ...	24
" " ...	—	Staphylococcus in ...	5
" " ...	—	Streptococcus in ...	1
Cerebro spinal fluid ...	11	Gram ...	2
" " " count ...	2	Meningococcus in ...	1
Gland puncture ...	15	Pneumococcus Cells in ...	3
Throat smear ...	6	Trypanosomes in ...	2
Pus smear ...	16	Bronchial spirochætes in ...	1
" " ...	—	Staphylococcus in ...	11
" " ...	—	Streptococcus in ...	3
Ulcer scraping ...	12	B. coli in ...	1
Pleural fluid ...	2	Spirochæta pallida in ...	5
Eye smear ...	8	Nil ...	Nil
" " ...	—	Koch-Weeks bacilli in ...	7
Vaginal smear ...	9	Gonococcus in ...	2
" " ...	—	" " ...	4
" " ...	—	Streptococcus in ...	1
" " ...	—	Yeast in ...	1
Blood culture ...	10	Doderkins bacilli in ...	1
" " ...	—	Pneumococcus in ...	1
Stool culture ...	11	Streptococcus „	1
Urine culture ...	2	Staphylococcus „	1
" " ...	—	B. dysenteriae flexner in ...	1
Sputum culture ...	1	Streptococcus in ...	1
Pus culture ...	1	B. coli in ...	1
Knee joint fluid ...	2	B. pyogenic ...	1
Splenic smear ...	2	Staphylococcus in ...	1
Peritoneal fluid ...	1	Nil ...	Nil
Hydrocele fluid ...	1	" ...	"
Blister ...	1	" ...	"
Skin section ...	6	" ...	"
Skin blister culture ...	1	Lepra bacilli in ...	2
Skin scraping ...	1	Streptococcus in ...	1
Ear smear ...	1	Yeast in ...	1
Scraping scabies ...	1	Nil ...	Nil
Vomiting smear ...	1	Diplococci in ...	1
		B. oppler boas in ...	1
	307		

CATTLE EXPERIMENTS—URINE (ALL STRONGLY ALKALINE).

Animal.	Condition.	S. G.	CO2 per c.c.	Urea %	Sugar.	Albumin.	Chlorides.	Phosphates.	Rations.	Blood.	
										Na Cl mgs per 100 c.c.	Ca mgs per 100 c.c.
2. Rumpe	Heavy in calf ...	1,042	7.6	0.93	+	Trace	Trace	Trace	Salt and Kanwa ad lib for 27 days.	631.3	4.5
5. Saige	Dry, in calf last calf a cretin	1,040	6.8	0.75	+	Albumose	Trace +	"		120.0	...
6. Rane...	Heavy in calf ...	1,040	5.6	0.75	+	Nil	Absent	"		350.7 (7/10/29)	16.0
12. Toka...	39 lb. milk per week, very poor condition	1,030	6.4	0.625	+	"	Trace	"		187.0 (16/10/29)	13.5
18. Kwola	44 lb. milk per week...	1,033	7.1	0.66	+	"	"	"		491.0	4.0
17. Danbule	Newly in calf...	1,034	9.0	0.58	+	"	"	"	491.0	8.0	
20. Alhaja	"	1,040	7.9	1.43	+	"	Absent	"	467.7	...	
GROUP II.											
5. Galaye	6 months in calf	1,032	7.35	1.44	+	Trace	.026	Trace +	No minerals for 30 days.	...	...
8. Tumbaye	50 lb. milk per week (4)	1,030	7.8	.78	+	Nil	.0130	Trace		480.0	9.0
15. Jidoma	8 months in calf (3)	1,030	8.5	1.21	+	"	.026	"		280.5	12.0
23. Dan Mundade	Always shows pica (2)	1,040	10.5	1.09	+	"	.02	.0225		514.0	8.0
1. Fure...	21 lb. milk per week (7)	1,020	5.2	.72	+	"	Absent	Trace		...	...

Figures in brackets equal years of age. Kanwa = Natron = Mixture of Carbonates of K and Na.

GROUP III (7 days after Group II).

URINE.							BLOOD.				
Animal.	Condition.	S. G.	CO ₂ per c. c.	Urea %	Sugar.	Albumin.	Chlorides.	Phosphates.	Rations.	Na Cl mgs per 100 c.c.	Ca mgs per 100 c.c.
8. Tumhay	...	1,023	7.6	0.63	+	Nil	Nil	Nil	Wood ashes and Kanwa for 7 days.	607.5	11.0
15. Jidoma	50 lb. milk per week (4) ...	1,030	8.15	1.10	+	"	Trace	"		...	...
23. Dan Mundade	8 months in Calf (3) ...	1,033	8.9	1.07	+	"	.03	.225		607.5	19.0
24. Dan Saige	Always shows pica (2) ...	1,020	1.4	2.45	+	"	.54	.0225		700.0	23.0
1. Fure ...	Cretin, son of No. 5 ($\frac{1}{2}$) ...	1,020	7.40	1.42	+	"	Nil	.01125		420.9	17.5
	21 lb. of milk per week (7)										

GROUP IV.

9. Kodayah ...	Not in Calf ($2\frac{1}{2}$) ...	1,040	7.35	1.42	+	Nil	.026	.0225	No minerals for 40 days.	584.3	11.0
10. Mundade ...	1 month in Calf (6) ...	1,040	8.8	2.35	+	"	.026	.00225		584.3	10.0
11. Uwargarke ...	6 years old ...	1,040	7.5	1.45	+	"	.007	.0225		654.3	13.0
22. Dangu ...	Heavy in Calf (7) ...	1,020	5.5	1.19	+	"	.005	Trace		...	19.5

GROUP V (7 days after Group IV was taken).

7. Waganhe ...	Heavy in Calf (6) ...	1,033	3.65	3.66	+	+++	.52	Nil	1. Nigerian Rock	795.0	10.0
9. Kodayah ...	Not in Calf ($2\frac{1}{2}$) ...	1,040	7.7	0.98	+	Nil	.13	"	2. Wood Ash.	700.0	16.0
10. Mundade ...	1 month in Calf (6) ...	1,042	6.9	2.15	+	++	.40	.0675		747.0	16.5
11. Uwargarke ...	(6) ...	1,040	8.8	4.85	++	Nil	.01	.00225		654.6	14.0
14. Shatu ...	1 month in Calf (4) ...	1,010	3.7	0.52	+++	"	Trace	Nil	3. Salt.	617.5	14.0

APPENDIX E.

ANNUAL REPORT OF THE PATHOLOGICAL
LABORATORY, CALABAR, 1929.

BY

G. W. ST. C. RAMSAY, M.D., F.R.F.P.S., D.T.M. & H.,
Pathologist.

REPORT OF THE PATHOLOGICAL LABORATORY, CALABAR.

This report must of necessity be rather brief because it only gives an account of the work done from September to December, 1929. No Pathologist was stationed in Calabar from October, 1928, until September, 1929, and, in consequence, there are no reliable figures on which to base a report for the whole year. The Staff consists of three Africans; one 1st Class, one 2nd and one Third-class Laboratory Assistant. They are the same men who worked well with me during 1927/28, and I have every reason to hope that they will continue satisfactory. During August an addition was built to the Laboratory. This has served to fulfil a much felt want which I indicated in last year's report. We now have more room in which to work, and there is space to arrange the apparatus satisfactorily. Another improvement has been the almost entire renewal of the benchwork. This has been done in mahogany, and I am sure that the expense will be well justified by the length of life and good service which the material will give. Electric light has been installed but there is no power to run incubators and water baths. It is hoped that we shall shortly be able to work these from a petrol gas installation which has been ordered. A paraffin oven has at last arrived and we have been able to do some morbid histology. It is hoped that Medical Officers working in the eastern provinces and Cameroons will support the laboratory and send as much material as possible. Tissues for histological examination and also specimens for putting up as permanent preparations will be very gladly received. A start has been made in an attempt to build up a small museum of pathological specimens. During my leave I made some enquiries regarding suitable methods of preserving the natural colour of museum specimens because I, in common with not a few others, have found the methods advocated in standard text books to give rather uncertain results. The method which I am using at present, although perhaps not quite perfect, is giving much better results than I have previously been able to obtain. The study which was begun in 1928 of the incidence of malaria and yaws among the school children of Calabar has been continued and a further 780 children have been examined. However, I do not wish to make any comment on the results obtained until the series totals at least 1,500.

BLOOD EXAMINATIONS.

1. *Parasites*.—A total of 1,318 individual patients have been examined for each of which both a thick and a thin film has been stained and scrutinised. 780 school children are included in the above figure. Table I shows the proportions in which the various parasites were present among all examinations.

TABLE I.

Parasite.	Number.	Percentage.
Subtertian malaria ...	173	13.1
Quartan malaria ...	20	1.5
Benign tertian malaria ...	1	0.08
M. perstans ...	282	21.4
M. loa ...	38	2.9
M. bancrofti ...	2	0.2

Quartan malaria is rarely seen except in children between the ages of four and nine years. Sporadic cases of benign tertian malaria are almost certainly accidental and most probably arise from some European who has been infected in other parts of the world and who still harbours gametocytes.

2. *Sachs-Georgi Test*.—This test was done 1,436 times and a positive reaction was obtained in 548 or thirty-eight *per cent.* of the cases. Again this total includes the school children referred to above.

3. *Van den Bergh Test*.—This test was done on nine occasions in four of which a biphasic reaction was obtained.

FAECES EXAMINATIONS.

1,344 stools were examined for ova and pathogenic parasites, and there were 473 re-examinations, making 1,817 examinations in all. The results obtained from the primary examinations are tabulated below from which it will be readily seen that the great majority of individuals harbour two or more helminths in their bowel.

TABLE II.

Parasite.	Number.	Percentage.
Negative	133	9.2
Ankylostome	688	51.2
Ascaris	1,019	75.8
Trichiuris	469	34.9
Strongyloides	62	4.6
Taenia	1	0.07
E. histolytica	17	1.3
Balantidium coli	1	0.07

The single case of infection with *Balantidium coli* is the first and only example which I have seen in Calabar in the course of two years during which I have examined over 3,000 stools. The patient was a child of thirteen years who was regularly attending his classes at school. There was some blood and mucus in the stool but the boy had no complaint.

MORBID HISTOLOGY.

Thirty-three specimens of tissue were embedded and sectioned for microscopic examination, and of these eleven were submitted from the operating theatre. In none of these specimens, apart from one case of rabies, did the appearances show anything of particular interest. No example of malignant disease was seen. Dr. Rawson sent a good specimen of *Cysticercus cellulose* in the tongue of a black pig from Victoria.

MISCELLANEOUS EXAMINATIONS.

These included urine examinations, total and differential cell counts, and examination of smears from various organs and discharges. *B. tuberculosis* was recovered from three sputa and *M. leprae* in one nasal discharge. 224 urines were examined and in thirteen *Schistosoma hæmatobium* was encountered.

POST-MORTEM EXAMINATIONS.

During the period of this report thirty post-mortem examinations were performed. The causes of death were as follows:—

Aplastic anæmia	1 case.
Asthenia	4 cases.
Bacillary dysentery	1 case.
Cerebral thrombosis	1 „
Cirrhosis of liver	1 „
Convulsions	1 „
Drowning	2 cases.
Gangrene of lung	1 case.
Gun shot wounds	2 cases.
Lightning	1 case.
Lobar pneumonia	1 „
Lobular pneumonia	1 „
Mitral stenosis	1 „
Multiple injuries	5 cases.
Nephritis	1 case.
Pyo-pneumo-thorax	1 „
Rabies	1 „
Strangulation	2 cases.
Tabes mesenterica	2 „

Certain of these sections revealed features of special interest and are described below.

1. Two cases in which death might be attributable to infection with *Ascaris lumbricoides*.

(a) A child aged about eighteen months was admitted to hospital with convulsions and died within a few hours.

There was a considerable degree of anæmia, but no jaundice or rashes were seen. The infant was well nourished. The hands and feet were in the characteristic positions of spasm associated with tetany. As far as one could judge, the bowel was completely obstructed in several places by knotted masses of dead ascaris. Apart from this nothing abnormal was detected in any of the organs, and it seems reasonable to assume that death was directly attributable to the presence of these clumps of round worms.

(b) A male aged about seventeen years died in hospital with severe anæmia. He was of average physique, but emaciated. No jaundice or rash was present, nor was there any appreciable œdema of the subcutaneous tissues. Forty-three living ascaris were found in the bowel, but there was very little ulceration of the mucosa. The internal organs were more or less bereft of fat. The liver showed slight fatty change and weighed 48 oz. The spleen was enlarged, dark red, and congested and weighed 40 oz. There was no appreciable reaction in the bone marrow of the femur, the appearance being quite normal. On microscopic examination of the spleen the sinuses were seen to be much congested and the malpighian bodies appeared small and scarce. Very little malarial pigment was present. In this case it seems possible that the hæmopoietic tissues were paralyzed and blood regeneration was arrested by the action of a toxin secreted by the worms.

2. Two cerebral cases have points of interest which might be mentioned.

(a) A woman aged about thirty-eight years died in hospital with hyperpyrexia (107.6°F). There was a slight degree of jaundice but no rash or hæmorrhages. The general nutrition and development were rather below the average. The heart weighed 16 oz. The semilunar valves were thickened and incompetent, and there was some syphilitic arteritis of the first part of the aorta. The coronary arteries were atheromatous. There was a gummatous lesion half an inch in diameter immediately below the semilunar valves in the membranous portion of the interventricular septum, but there was no perforation into the right ventricle. The lungs were œdematous but healthy. The meninges were very congested and so also was the substance of the brain, but no hæmorrhages were present. A thrombus was present in the basilar artery and extended upwards into the middle cerebral artery.

(b) A policeman aged about forty years was admitted to hospital much against his will and died shortly afterwards. During his quiet moments he said to the nurses, "I was bitten by a dog on the finger about six weeks ago. I have got hydrophobia and I am going to die". Clinically, there was no doubt whatever but that he was suffering from rabies. On the inner aspect of the second finger of the right hand there was a well healed scar of a wound which might have been caused by the bite of a dog. The man was of good development and well nourished. The post-mortem was done half an hour after death. The right arm was flaccid but the left arm and both legs were in a state of spasm. The meninges were congested. The brain weighed 44 oz. and there was some œdema and a fair degree of generalized congestion. The stomach contained a small quantity of altered blood but the focus of origin was not discovered. Apart from the presence of ankylostome and ascaris the bowel appeared to be healthy. The liver weighed 52 oz. and was dark and congested. The kidneys showed some cortical congestion. Microscopic examination revealed the presence of negri bodies in the basal ganglion cells of the brain.

3. An interesting case of what appears to be subacute tuberculosis may be cited.

A male aged about thirty-eight years died after being in hospital for nearly four months. The body was of average physique but very emaciated. No jaundice, œdema or rash was detected. There was no palpable enlargement of the superficial lymphatic glands. On the inner aspect of the right thigh there was a lipomatous tumour weighing 10 oz. The heart weighed 4 oz. and was devoid of epicardial fat. The muscle was soft and flabby but the valves appeared to be competent. The lungs were rather collapsed and there was no evidence of old or recent tuberculosis. The peritoneal sac contained about one and a half pints of clear ascitic fluid. The retroperitoneal glands were enlarged, soft and discrete, but showed no evidence of caseation. The bronchial glands were similarly enlarged. No lesion in the peritoneum or bowel was found to account for the glandular hyperplasia. The liver weighed 32 oz. and was the seat of fairly advanced multilobular cirrhosis. The spleen weighed 8 oz. Externally it showed old perisplenitis and on section the surface was found to be studded throughout with grayish nodules suggestive of tuberculosis or even lymphadenoma. Most of the nodules were about one-eighth of an inch in diameter but there were two with a diameter of nearly an inch. Microscopic examination of the spleen showed a moderate degree of fibrosis. The nodules consisted of typical tubercles with giant cell production, and in some there was early caseation. The glands showed proliferation of the epithelial elements almost to the entire exclusion of the lymphoid tissue. Tubercle bacilli were not found after repeated search in either the glands or spleen. In the liver there was a fair degree of round cell infiltration associated with the new fibrous tissue, and in the kidney, which showed cloudy swelling of the tubular and glomerular epithelium, there were isolated areas of small round cell infiltration.

There seems to be little doubt but that this was a case of subacute tuberculosis although no bacilli could be demonstrated.

4. Death by lightning is not commonly met with, and even an ordinary case presents some interest.

A male aged about twenty-four years was picked up dead in the street during a tornado. He had been walking in company with a woman, and, apparently, both were struck by lightning. The woman escaped with a lacerated wound of the leg but the man was instantaneously killed. Examination of the deceased revealed a small wound on the back of the scalp. The right eye was suffused but the left was normal. There was no spasm of the limbs nor were there any fractures, burns, or markings. The vessels of the head and neck including the brain were very congested, but there was no hæmorrhage. The thymus was large and weighed 2 oz. In a case such as this where the findings are largely negative one wonders what role to assign to the enlarged thymus. Would the man have succumbed to this particular shock if the thymus had undergone its natural involution ?

5. Finally, a case of bacillary dysentery is worthy of mention.

A male aged about twenty-four years died in hospital with symptoms of general exhaustion due to chronic dysentery. No pathologist was in Calabar when the man was admitted with acute dysentery and, in consequence, the organism was not isolated; nor was I able to isolate any pathogenic organism from the bowel at the post-mortem examination. The large bowel was the seat of extensive ulceration of a rather acute variety. In the small intestine there were four separate and distinct areas of chronic ulceration. The mucous membrane at the site of the ulcers was bile stained and there was such a degree of stenosis that a lead pencil was with difficulty passed through the lumen of the intestine at these points. The visceral peritoneum over the ulcers showed a mild plastic peritonitis. Microscopic examination revealed necrotic changes in the mucosa, much fibrosis of the muscular coat, and chronic inflammation of the peritoneal layer. No amœbæ were seen in sections of either large or small intestine.

G. W. ST. C. RAMSAY.

APPENDIX F.

ANNUAL REPORT ON THE X-RAY DEPARTMENT,
LAGOS, 1929,
BY
H. H. STEWART, M.B., CH.B.
Specialist.

AFRICAN HOSPITAL—LAGOS.

X-RAY DEPARTMENT—ANNUAL REPORT 1929.

X-rays.—The majority of examinations have been of a routine nature, being mostly fractures of the limbs due to accidents in the immediate vicinity of Lagos.

As a routine all fracture are now examined on admission to the hospital and subsequent examinations made to determine final position or progress of union.

In addition the outside dispensaries and hospitals have contributed largely to the flow of patients.

There has been a well marked increase in the number of opaque meals, the majority of cases being those of Europeans. Gastric ulcer and allied conditions are not common in the country native, those who show signs of such disturbances being without exception town dwellers.

Several years ago, attention was called to the fact that in the African community but few cases of malignant disease were demonstrated by X-ray examination, and nothing has occurred since to modify this statement.

The signs and symptoms of tuberculosis of the lungs are as a rule so definite that X-ray examination is not required. In a number of cases however it has been possible to demonstrate early disease of the lungs in cases that presented considerable difficulties of diagnosis.

In common with other parts of the hospital this department has been inconvenienced to a great extent by the rebuilding operations, now happily drawing to a close.

The subjoined table gives the number of cases treated and classified for convenience of reference into the more common examinations.

Of necessity many parts of the body have had to be included in the "not classified" list.

Arthritis	...	...	...	...	...	12
Barium meal	...	...	...	...	...	59
Bladder	...	...	...	...	...	3
Chest	...	...	...	...	...	42
Dislocations	...	...	...	...	...	8
Foreign bodies	...	...	...	...	...	24
Gall bladder	...	...	...	...	...	3
Head	...	...	...	...	...	26
Jaws	...	...	...	...	...	30
Joints	...	...	...	...	...	83
Kidney	...	...	...	...	...	11
Upper limbs—fractures	...	...	...	...	...	109
Lower limbs—fractures	...	...	...	...	...	76
Necrosis bone	29
Osteomyelitis	33
Periostitis	24
Spine	18
Not classified	143

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Electro-Therapeutics.—Treatments were undertaken of both acute and chronic conditions. In the former class that of gonorrhoeal arthritis shows the best and most spectacular results when treated with diathemy. As a rule all pain is absent at the end of four applications at forty-eight hour intervals, and complete restoration of function would appear to be greatly accelerated. The earlier the treatment can be applied the better the prognosis.

Chronic lesions are of course more difficult to treat owing to the patient becoming tired of his complaint and lacking the necessary patience to continue with the long sittings necessary. Many very chronic ulcers have changed for the better under the influence of ultra violet light only to revert to the original condition as soon as treatment was discontinued.

General irradiation of the body would seem to have but little influence on the healing of these ulcers whilst local application has in many cases a most beneficial effect.

The table below shows the principal conditions which have come for treatment during the current year :—

Adenitis	...	...	...	...	...	36
Arthritis	...	...	...	...	...	321
Boils	...	...	...	...	...	5
Debility	...	...	...	...	...	1
Fibrositis	...	...	...	...	...	2
Granuloma	...	...	...	...	...	58
Impetigo	...	...	...	...	...	58
Local injuries	...	...	...	...	...	34
Lumbago	...	...	...	...	...	14
Lupus	...	...	...	...	...	6
Leukæmia	...	...	...	...	...	3
Neuritis	...	...	...	...	...	57
Neuralgia	...	...	...	...	...	14
Paralysis	...	...	...	...	...	58
Rheumatism	...	...	...	...	...	31
Ringworm	...	...	...	...	...	311
Sciatica	...	...	...	...	...	17
Synovitis	...	...	...	...	...	44
Skin, various	...	...	...	...	...	145
T. B. glands	...	...	...	...	...	83
Ulcers	...	...	...	...	...	445
Warts	...	...	...	...	...	6
Various	...	...	...	...	...	19
						<hr/> 1,768 <hr/>

H. STEWART,
Specialist.
 10.2.30.

APPENDIX G.

REPORT ON THE PHARMACY SCHOOL, LAGOS, 1929,

BY

GORDON TAYLOR, M.R.C.S., L.R.C.P
Superintendent.

SCHOOL OF PHARMACY, LAGOS—REPORT FOR 1929.

PREMISES.

1. The former premises being required for other purposes the school was transferred to the pathological block of the new African Hospital in September. The new premises, although temporary, are a great improvement on the old. There are two large, well-ventilated rooms which are used as lecture room and pharmaceutical laboratory respectively. There are also three smaller rooms which are used respectively as office, students' cloak room, and office for the Secretary to the Board of Medical Examiners.

As there were no facilities for teaching Practical Physics and Practical Chemistry, classes in these subjects were conducted in the laboratories of King's College.

STAFF.

2. The staff consisted of the Superintendent, the Assistant Superintendent, and two Second-class Dispensers of the African Staff.

The Superintendent proceeded on leave on April 2nd, and resumed duty on September 11th. During his absence a Senior Dispenser and a Second-class Dispenser, both of the African staff, were temporarily posted for duty at the school. After the Superintendent had returned, the former proceeded to Port Harcourt, the latter having been transferred to Jos on June 5th.

The Assistant Superintendent assumed duty on September 25th.

DEMONSTRATORS.

3. Five demonstrators were appointed during the year, one for each of the following subjects:—Pharmacy, Chemistry, Pharmacognosy, Physics, and Botany. As in former years no senior student was appointed unless he had passed with distinction in a competitive examination in the subject selected by him. No student was allowed to enter for the examination unless his conduct and character had been exemplary. No demonstrator received any honorarium.

STUDENTS.

4. The number of students registered in the school during 1929 was forty-two. Of these twenty-five were subsisted by Government, two by the Native Administration of Ibadan and one by the Native Administration of Zaria.

During the previous year the number of students was fifty-five, the decrease of thirteen being due to the fact that of the twenty private students registered in that year, seven passed the Dispenser's Examination and six left of their own accord.

DUTIES OF STAFF.

5. During the first quarter of the year the Superintendent performed the administrative duties of the school, attended the meetings of the Board of Medical Examiners, acted as a member of the Sub-Committee appointed by the Board to conduct in January the Dispenser's Examination, and conducted the Examination of Entrance in the same month. The Superintendent lectured on Official Pharmacy and Urine Analysis to all classes preparing for the Dispenser's Qualifying Examination. To the senior and intermediate classes he lectured on Botany, Physics, and Inorganic Chemistry, and to the intermediate class on Pharmaceutical Chemistry. He also conducted the classes in Practical Chemistry for senior and intermediate students and the classes in Practical Physics and Practical Urine Analysis for all students. As there was insufficient time during the day, the Superintendent lectured in the evenings to the two students who were preparing for the Chemist and Druggist's Examination.

During the last quarter the Superintendent again performed the administrative duties of the school, attended the meetings of the Board, and acted as a member of the Sub-Committee appointed by the Board to conduct the Dispenser's Examination in October. He lectured to all classes in Botany and Urine Analysis, to the senior class in Pharmaceutical Chemistry, and conducted the classes in Practical Physics. Acting on the instructions of the Honourable the Director of the Medical and Sanitary Service, the Superintendent proceeded in November to Zaria. After consulting with the Divisional Engineer of the Public Works Department, he submitted a report upon the alterations which would be necessary for the conversion to a School of Pharmacy of the buildings originally erected as an Infectious Diseases Hospital. From Zaria he proceeded to Katsina to report upon the medical students-in-training there.

The Assistant Superintendent assumed duty at the beginning of the last quarter. He lectured to all classes on Official Pharmacy, Inorganic Chemistry and Physics, and to the intermediate class on Pharmaceutical Chemistry. He also lectured to the two students who were preparing for the Chemist and Druggist's Examination and conducted the class in Practical Chemistry for senior students. During the absence of the Superintendent at Zaria the Assistant Superintendent performed the administrative duties of the school. The senior Second-class Dispenser lectured to all classes on General Pharmacy, Forensic Pharmacy, and Prescription Reading and conducted the class in Practical Chemistry for junior students. When not engaged in lecturing he supervised the work in the pharmaceutical laboratory.

In the first quarter the junior Second-class Dispenser lectured to all classes in Pharmacognosy, to the senior class in Pharmaceutical Chemistry, and to the junior class in Botany and Physics. In his capacity as Secretary to the Board of Medical Examiners he attended to the clerical work connected with the Board and issued the certificates and licences under the Poisons and Pharmacy Ordinance. During the second and third quarters his duties as Secretary were taken over by the Senior Dispenser. During the last quarter he re-assumed his duties as Secretary to the Board of Medical Examiners, lectured to all classes in Pharmacognosy, and assisted in the pharmaceutical laboratory.

During the second and third quarters the Senior Dispenser performed the administrative duties of the school and lectured to all classes in General Pharmacy and Prescription Reading. During the short period of his office at the school the relief Second-class Dispenser lectured to all classes in Forensic Pharmacy, to the junior class in Botany, and assisted in the pharmaceutical laboratory. The remainder of the lectures and the practical classes were conducted by the two Second-class Dispensers on the permanent staff.

From time to time the governing authority of the school was called upon to calculate the percentage of active ingredients in the preparations officially classified as Dangerous Drugs which were imported during the year. On behalf of the Honourable the Director of the Medical and Sanitary Service, he also certified on invoices the articles containing ethyl alcohol and exempt from Custom's Duty.

DUTIES OF DEMONSTRATORS.

6. During the year the demonstrators prepared the reagents and materials required for the practical classes in their respective subjects. They also supervised the daily duties allocated to the students engaged in cleaning and tidying. Once each week they lectured and demonstrated to the students in their respective subjects, and they assisted backward students. The demonstrator in Chemistry and the demonstrator in Physics assisted at the practical classes at King's College. The demonstrator in Botany also assisted in the type-writing and clerical work of the office.

DUTIES OF STUDENTS.

7. As a proper system of apprenticeship is meanwhile impracticable the students, under the supervision of the staff and demonstrators, assisted in turn in the cleaning and tidying of the school premises. This constitutes an important part of the training of a dispenser.

Each day, except Sunday, two senior students attended during the forenoon for duty at Massey Street Dispensary. In the Pharmaceutical laboratory the students dispensed stock mixtures, ointments, powders, suppositories, urethral bougies, pills, etc. for local Government dispensaries, the work being carefully checked and supervised by the staff. They also dispensed preparations of hydnocarpus oil for the Nigerian Secretary of the British Empire Leprosy Relief Association.

CLASSES.

8. As in former years a student, on admission, was appointed to the junior class. At the end of his first year, and provided that his work and attendance had been satisfactory, the student became eligible for promotion to the intermediate class; and at the end of his second year, his work and attendance still having proved satisfactory, he became eligible for promotion to the senior class.

Those students who had completed their training to the satisfaction of the governing authority were granted certificates to that effect. They were then entitled to enter for the Dispenser's Examination.

CURRICULUM.

9. As in former years the subjects of the curriculum for the Dispenser's Examination consisted of Pharmacy, Dispensing, Prescription Reading, Chemistry, Pharmaceutical Chemistry, Pharmacognosy, Botany, Physics, Forensic Pharmacy, and Urine Analysis. The syllabus in each of the above subjects is fully set out in the Rules made by the Board of Medical Examiners and published separately. No change was made in any syllabus throughout the year.

A. Pharmacy.—Each week four lectures were given on Official Pharmacy, that is, on the chemicals, galenical preparations, and crude drugs mentioned in the British Pharmacopoeia, 1914. The lecturer also explained in general terms the history and therapeutic uses of the various drugs and made special mention of the drugs in common use in the tropics. Specimens of the drugs under discussion were exhibited to the students and examined while the lecturer described them.

Lectures were given twice weekly on General Pharmacy, that is, on the methods commonly employed in the preparation of crude drugs for administration. So far as facilities permitted students were given the opportunity of putting into practice the pharmaceutical operations described in the lecture.

B. Dispensing.—From autograph prescriptions the students dispensed mixtures, powders, pills, ointments, applications, emulsions, suppositories, bougies, etc., and wrote complete reports detailing *modus operandi*, chemical and physical changes, and peculiarities, if any, in dose and compatibility.

Special attention was given to the cultivation of habits of cleanliness, accuracy and despatch. Valuable practice in dispensing was obtained by the senior students through their attendance at the Massey Street Dispensary.

The staff conducted investigations on problems which arise in tropical dispensaries. As a result, suppositories and bougies were made so that they could be kept satisfactorily without in any way losing their therapeutic effect. A pill excipient was made which acted as a good binding agent and preservative against hardening, crumbling and deterioration. Investigations were also conducted on the preservation of drugs, a report of which is appended below.

C. Prescription Reading.—Lectures were given twice a week on the Latin Grammar of Pharmacy, the construction of the prescription, and Latin medical formulæ. At the conclusion of the lectures specimen prescriptions were written on the blackboard and questions were put to the class on the grammatical construction, translation, posology, etc. Students were trained to detect errors and overdoses and to re-write prescriptions in full and correct Latin.

D. Chemistry.—Each week four lectures were given to the junior class and special stress was laid on the fundamental principles underlying the science of chemistry. Simple experiments were performed by the lecturer to illustrate his remarks and every effort was made to show the importance and the interest of the subject. The senior and intermediate classes were taken together for this subject and in two lectures each week received a course of instruction in the principal properties and reactions of the more important metals and non-metals. The junior class attended at King's College on Monday evening of each week and the senior and intermediate classes on Tuesday evening. Simple experiments were performed by the junior class and efforts were made to co-ordinate the practical and the theoretical work. The senior and intermediate classes were trained in the principles of qualitative analysis and were given considerable practice in the analysis of unknown substances, especially of simple salts and the alkaloids and other organic compounds mentioned in the syllabus.

The necessary reagents were prepared in the school by the demonstrator in chemistry and the greater part of the apparatus was supplied by the school.

E. Pharmaceutical Chemistry.—The senior and intermediate classes each received two lectures per week.

The intermediate class was instructed in the general principles of organic chemistry and studied the properties of the more important groups and compounds. The methods of detecting and estimating the elements in organic compounds were fully explained and mention was made of the great importance of this subject.

The senior class revised their knowledge of general organic chemistry and studied in detail the modes of preparation, properties, and classification of the more important organic compounds used in medicine.

F. Pharmacognosy.—Two lectures per week were given in Pharmacognosy to all classes in conjunction. Stress was laid on the methods of recognising drugs by means of their morphological characters and in some cases by simple chemical tests. The students were given the frequent opportunity of examining and handling crude drugs and learned the botanical or zoological sources, natural orders and habitats of the various drugs, an understanding of the habitats being obtained by frequent reference to a map.

G. Botany.—The junior class attended twice weekly for lectures and for practical and experimental work. The cytology, histology, morphology, and anatomy of plants were studied macroscopically and microscopically. Simple experiments in physiology were described and performed.

The same subjects were studied twice weekly by the senior and intermediate classes but in a more advanced form.

Plant specimens were specially grown by the staff, and students were encouraged to bring specimens to the class.

H. Physics.—The junior class attended twice weekly for lectures and were instructed in the system of units, in elementary dynamics, the principles of thermometry, and the general effects of heat. Illustrations were given of how these principles have been adapted to the service of man.

The same subjects were studied twice weekly by the senior and intermediate students but in a more advanced stage. Problems were solved relating to the expansion and contraction of solids, liquids and gases.

All classes attended once weekly at King's College where practical work was done on measurement and heat. Students performed experiments involving the use of the balance, the employment of measuring apparatus, and investigated the phenomena of expansion. Experiments were also performed with thermometers, barometers and hygrometers.

I. Forensic Pharmacy.—One lecture was given weekly to all classes on the regulations contained in the Poisons and Pharmacy Ordinance and Dangerous Drugs Ordinance. Students were instructed in the correct method of making entries in the Disposal of Poisons Book, in the correct methods of storing and dispensing poisons, and stress was laid on the dispenser's responsibilities in his relations with the public.

J. Urine Analysis.—All classes attended once weekly for lectures and demonstrations in Urine Analysis. Specimens of urine were obtained from the African Hospital through the courtesy of the Matron. Special mention was made of the collection and preservation of twenty-four-hourly samples and in addition to instruction in ordinary methods of examination, special attention was given to the abnormal constituents found in urines from patients suffering from certain tropical diseases.

Lectures were given to the two Second-class Dispensers on the School Staff on the subjects of the syllabus for the Chemist and Druggist's Examination. The Superintendent and the Assistant Superintendent assisted in solving problems in Chemistry, Physics, and Pharmacy, and conducted special classes in Volumetric Analysis, Practical Botany, assay processes, and the study of Light.

EXAMINATIONS.

10. The Dispenser's Examination was held in January and in October. Eight candidates satisfied the examiners in January and five in October. Two candidates passed the Examination of Entrance, also held in January.

The annual school examinations were held in December and were conducted in accordance with the syllabus. On the whole the results were satisfactory, and improvement being noticed in the essential subjects. Monthly oral examinations were also held but were discontinued in September as the beneficial effects were out of proportion to the time necessarily spent on them. Weekly examinations however, were held throughout the year on Practical Pharmacy and Dispensing. These examinations proved of great value in assessing a student's progress, and the records, carefully kept, provided an index of the student's work throughout the year.

VACATIONS.

11. While the examinations under the Ordinance were being held the school was closed for vacation.

HEALTH OF THE STUDENTS.

12. On the whole the health of the students was good. Every attention was paid to the ventilation and cleanliness of the school and due regard was paid to matters of hygiene. There were several cases of minor ailments, especially during the harmattan season, and students who required medical treatment were sent by the Superintendent to the out-patients' department of the African Hospital. No case of notifiable disease was reported.

DISCIPLINE.

13. Punctuality and obedience were strictly enforced and the staff encountered little trouble in maintaining discipline. The demonstrators acted as prefects and proved of great assistance to the staff in disciplinary matters.

PRESERVATION OF DRUGS.

14. This being a serious problem in Nigeria, especially in the Southern Provinces, an investigation was carried out by the staff into the cause and prevention of the deterioration of drugs and medicaments. It was found that the physical and chemical changes which occur appeared to be due to the high average temperature, the excessive degree of humidity, and the action of the strong sunlight. Even many of those elements and compounds which are stable under temperate climatic conditions were found to undergo physical or chemical change. For instance, relatively low melting substances which in temperate countries are more or less solid were generally met with in a semi-solid or liquid state. This was obviated to some extent by storing these substances in the coolest possible places. The potency of tinctures and other spirituous preparations was seriously affected by the volatility of the solvent and the consequent deposition of extractive and other matter. This was prevented to a large extent by the addition of a small quantity of glycerine. The rapid evaporation of ether, ammonia from ammoniacal solutions, prussic acid from the official solution, etc., were prevented by keeping the bottles inverted. The high average temperature was also responsible for the loss by volatilisation of certain solid substances as for example menthol, camphor, and iodine.

The moist air was found to be responsible for the hygroscopicity and deliquescence of certain chemicals which under normal conditions remain dry. This occasioned considerable loss in itself and, moreover, chemical decomposition was accelerated. For example, sodium acetate, sodium hypophosphite, sodium thiosulphate soon became almost entirely liquid, and ferrous sulphate slowly changed into what seemed to be a basic ferric compound.

The strong sunlight was responsible for many cases of deterioration and decomposition even when the drugs were stored away from the direct rays of the sun. Several drugs underwent partial or superficial carbonisation. This was evident by the gradual darkening and decrease in solubility of such drugs as thymol, quinine bisulphate and other quinine compounds, tannic and gallic acids, resorcin and chrysarobin.

In the great majority of cases decomposition was prevented by keeping the drugs in amber-coloured stoppered bottles. Recent investigations in England tended to show that one of the causes of decomposition was the absorption of radiant energy or of oxygen, the rate of oxidation being accelerated by the light. It was found that amber-coloured glass absorbed the ultra-violet rays and comprehensive tests proved conclusively that the vitamin content of certain preparations and the chemical composition of others remained unaltered when these preparations were stored in bottles of amber-coloured glass. So far as chemical decomposition was concerned these findings were borne out by the experience of the school staff. As a result supplies of drugs and chemicals were ordered to be supplied in amber-coloured stoppered bottles and the results proved very satisfactory.

APPENDIX H.

REPORT OF THE NIGERIAN BRANCH
BRITISH EMPIRE LEPROSY RELIEF ASSOCIATION, 1929.

BY

DR. T. F. G. MAYER.

Secretary.

REPORT OF THE NIGERIAN BRANCH, BRITISH EMPIRE LEPROSY RELIEF ASSOCIATION, 1929.

At the close of 1928, as noted in the Annual Medical and Sanitary Report for that year, Treatment Centres had been established in thirteen places in the Northern Provinces, and twelve places in the Southern Provinces with a total of 2,975 lepers under regular treatment.

These centres were increased in number during 1929 to twenty-four centres in the Northern Provinces and twenty-seven in the Southern Provinces with a total of 3,630 lepers under regular treatment.

These figures give a very inadequate idea of the amount of work actually done by those engaged in it because all lepers, not willing or unable to undergo, regular treatment are rigidly excluded, though a certain number of "burnt out" cases, who are really past all hope of medical aid—being really infirm patients—are included.

The proportion, however, of these to the early cases is diminishing rapidly as those engaged in the work get an increasing number of early cases and find that the treatment by injections of "burnt out" cases tends rather to lead to disappointment both on the part of doctor and patient.

The distribution of the necessary drugs for use in leprosy was organised; hydnocarpus oil being obtained in bulk from India.

100,000 full doses of this and 24,400 full doses of alepol were distributed during the year besides such other drugs used in leprosy as avenyl, potassium antimony tartrate, potassium iodide and so on.

This of course, does not include the medicines supplied and sent out by the Medical Department to its own officers.

In order to make up and distribute the latest prescription recommended for intramuscular injection by Dr. Muir, namely equal parts of hydnocarpus oil and the esters of the oil, alcohol was imported in bulk from England and a commencement was made at the preparation of the esters from the oil through the courtesy of the Government Analyst.

The demand for the above prescription having exceeded the facilities of this laboratory the work has been taken on with no little enthusiasm by the Pharmacy School. In this way all demands have been met, though the officers of these departments have had some trouble to cope with them.

3,000 case cards were sent to those asking for them and have been found convenient, by some, for recording their cases.

Literature, as it is received from the Central Branch of the Association, is distributed to all known to be treating lepers even if they have only one case under treatment. There have been many signs that this literature is appreciated.

The result is now, that the medical men are absolutely up to date in the theoretical knowledge of the disease while an ever-increasing number are accumulating a useful store of clinical experience. Some have even more than three years' experience of treating a great variety of cases of leprosy.

Leper labour has been increasingly utilised notably at Vom, where the Mission treating them have paid leper patients to erect a number of new buildings and to put in a break-ram water supply, and at Itu.

At Itu, during a time of political unrest, 300 leper patients were engaged as Special Constables. They were on duty in squads night and day for some weeks and received the thanks of Government for their services.

The protection of children from infection is perhaps the most difficult part of the work. It is being undertaken on modern lines by Mrs. MacDonald at Itu. Elsewhere great care has to be exercised before introducing so revolutionary a measure among a shy and difficult people.

The Native Administrations, as was stated in last year's Report, were known to be keen on the work but I do not think any one could have anticipated how willing they were to support and further it by grants of land, by the payment of salaries, payment for drugs and by every other means in their power.

Nigeria has been in the past spending large sums on the treatment of people past all hope of cure to the relative neglect of the early cases. These are now beginning rapidly to exceed the late cases with proportionate increase in value for money spent, in the cure of the patients, in useful labour and in gratitude.

[illegible]

APPENDIX I.

SYLLABUSES FOR TRAINING OF AFRICAN
SUBORDINATE STAFF.

TRAINING OF NURSES.

SUB-COMMITTEE.

President—DR. L. WYNNE DAVIES, A.D.M.S.

DR. H. H. STEWART, Specialist.

DR. H. S. KEER, Lady Medical Officer.

MISS SINGLE, Matron.

MISS EVANS, Matron.

The subject matter and time table of the syllabus of lectures on nursing (medical and surgical), anatomy and physiology, hygiene as prepared in detail has been agreed to unanimously.

2. The lectures in nursing and hygiene to last for three-quarter of an hour. Those in anatomy and physiology, half an hour each, physiology to follow anatomy in the same lecture.

3. The whole course to be completed within six months. Two complete courses or sessions in the year with examinations as per syllabus.

4. Complete training to take three years before promotion to Second-class Nurse grade to take effect from the next enrolment.

5. First year students to be trained in an elementary fashion in the subject of the standard syllabus.

Second year students to be taught separately in a more advanced reading of the syllabus.

Third year students to receive advanced instruction more by demonstrations in the wards and out-patient department and by the use of text-books. Latitude to be allowed to the teachers in the presenting of the subjects of the standard syllabus.

6. Use of text-books to be discouraged except to third year students.

7. Lectures to be delivered at the most convenient times to instructors and instructed.

8. Nurses-in-training to be enrolled at the commencement of sessions only, *e.g.*, January and July of each year.

9. Night nurses to attend all lectures. All night nurses should take night duty in rotation for periods which should not exceed one week.

10. **Age of Enrolment.**—Preference will be given to candidates of minimum and optimum age, *e.g.*, school leaving age of sixteen years, and also to those who have remained at educational establishment until the period of enrolment.

11. Standard VI will be the standard for the South or Middle School IV when the new scheme is agoing. A lower standard will prevail in the North for a time.

12. **Examinations.**—Sectional. Oral only at the end of each month—a full written or oral examination at the end of six months on the whole subject. Fifty *per cent.* marks required for a pass.

If the pupil fails twice in obtaining fifty *per cent.* of marks at the end of session examination (except in very special cases), his probation period is liable to be terminated.

Indenturing will take place after passing of the examination at the end of the first six months' course.

13. **Breaking of Indenture.**—Indenturing to be insisted on, and necessary for parents, near relatives of mature age or clergymen of the religious persuasion of the indenturee to sign as guarantors.

14. **Posting to European Hospitals.**—Nurses-in-training to be kept for training altogether in African Hospitals. Exceptions will be made in the case of Female Nurses-in-training and in certain hospitals such as Onitsha, Ibadan, etc.

15. Standard equipment agreed to as in List. Text-books used only by the instructors will be kept in the Medical Library.

16. An outside Board to be appointed to examine for promotion examination, such examinations being from Second to First-class, from First-class to Charge, from Charge to Senior. These examinations for higher promotions will depend largely on practical and oral tests given by the Board of Examiners,—one centre being in Lagos and one in Kaduna. A six monthly Progress Report on the Card Index System as introduced by Dr. H. H. Stewart in the African Hospital, Lagos, to be adopted generally.

17. Female nurses to be posted only to female wards.

The syllabus on being put forward for approval by the Honourable Director of Medical and Sanitary Service to the General Committee was unanimously adopted. 13/12/29.

NURSING LECTURES AND DEMONSTRATIONS.

(Medical—Twice weekly.)

1. **Introductory.**—Personal cleanliness, obedience, observation, method, memory, records, reports, tact, truthfulness, patience, propriety, forethought, preparation, celerity, honesty, sympathy especially to outcast and lepers.

2. Learning names of common articles in ward, bathroom, lavatories, pantry, kitchen and outpatient department.

3. Care of furniture, bedsteads, cupboards, tables, bedding, linen and blankets.

4. Management of ward, ventilation, light, discipline of patients.

5. Care of bathroom, baths, lavatories, cleaning bedpans and urinals, disposal and disinfection of soiled linen and dressings.

6. Bed-making in general. Draw sheets, changing linen, special cases.

7. **Use of Thermometer.**—Instruction—where temperatures are taken and noting especially difficulty in children, delirious and unconscious—importance of accuracy, seeing thermometer in order before use—how to shake down—differentiate between normal, sub-normal, pyrexia and hyperpyrexia—temperature charts—how to record. Two-hourly, four-hourly or twice daily.

8. **Pulse Examination.**—Best positions after insuring equanimity of patient, note rate, rhythm, tension, volume—use two fingers—how to record on chart—number of times taken in day. Mention diseases of heart and vessels.

9. **Receiving new cases.**—Admission of, note general aspect and demeanour of—pulse, breathing, temperature, skin condition, pain, rigor sweating, fits, vomiting, diarrhoea, if unconscious, cough, shortness of breath, distress, etc. Disinfection of head, armpits, pubis—weighing patient.

10. **Care of Patient.**—Note difference between medical and surgical, clothing, arrangement of bed, assistance in weakness and pain, meals, local applications (fomenta—hot water bottles), administration of medicines, sponging, bathing in bed, use of urinal and bedpan, care of hands and feet, care of mouth and back—note if any excretions or discharges.

11. **Respiration.**—Description of, inspiration, expiration, normal rate in children and adults,—types thoracic, abdominal, dyspnoea or orthopnoea, show how altered in disease, *e.g.*, of larynx, trachea, bronchial tubes, lungs, pleura—mention tracheotomy and special nursing of. Show how to chart rates.

Sputum.—Different kinds and significance in disease.

12. **Alimentary System.**—Note tongue and its departure from normal. State of teeth, mouth. Note stomach contents if vomited and odour of breath of patient.

Examination of stools.—Colour, smell, consistence, if any helminths, blood, mucus, pus and how evacuated if with pain or straining—mention diarrhoeas, dysenteries.

13. **Urinary System.**—The urine, colour, quantity in twenty-four hours, clarity, reaction, deposit, odour—simple tests for albumen, sugar, blood, urates, and phosphates—mention commonest disease of kidney and bladder causing abnormality.

14. & 15. **Chief remedial measures entrusted to Nurses.**—*e.g.*, giving of medicines—measure and measure-glass,—how to make poultices (different kinds) fomentations, and plasters, blisters, packs hot and cold, giving enemata—purgative (soap or soap and turpentine—glycerin—olive oil, starch and oil), giving of stimulants, mouth washes, counter-irritants, iodine, liniment, sinapisms attention to eye (Latching), icebag.

16. **Management of Emergencies.**—Shock, fits (apoplectic, epileptics) convulsions children, haemorrhages (lung, stomach, uterus, nose) delirium (alcoholic poisoning, mania, ju-ju obsessions).

17 and 18. **Nursing of Special Cases.**—Typhoid, typhus, relapsing fever, cholera, dysentery, plague, yellow fever, cerebro-spinal meningitis, acute rheumatism, diabetes, eclampsia, infantile convulsions, diseases of heart, acute pneumonia, bronchitis, pleurisy, asthma, bronchiectasis, smallpox, chicken-pox, measles—venereal diseases (gonorrhoea and syphilis).

SIMPLE HYGIENE FOR NURSES.

(Three quarters of an hour once every other week.)

TEXT-BOOKS:—HYGIENE FOR STUDENTS AND NURSES—PROF. GLAISTER—LAWS OF HEALTH—CORFIELD.

1. **Definition of Hygiene.**—Application in both health and sickness, seasonal and climatic influences, general principles.

2. **Air.**—Composition of atmosphere, impurities in air of inhabited rooms—effect on man of breathing impure air—diseases carried by air.

Ventilation.—Definition of—show method of ventilating dwelling-house, sick rooms, hospital wards, school-rooms, operation theatre, natural and artificial ventilation.

3. **Drainage.**—General principles of—open and closed drains, sump pits, soil pipes, waste pipes from lavatories, kitchens, latrines, etc., avoid contamination of surface soil by not emptying liquid excreta, filthy water or liquid food or to surface. All standing water to be attended to either in pots, tanks or surface pools or puddles. Wire screening—refer to malaria and mosquito breeding.

4. **Water.**—Composition of pure water—quantity necessary for hospital usage. Common impurities and effect on health—purification of water (filtering, boiling, medicating) shallow and deep wells. Diseases carried by, *e.g.*, dysenteries, guinea-worm.

Baths.—Cold, hot, medicated.

Bathrooms.—Fittings.

Latrines.—Disposal of slops and excreta—wet and dry conservancy, salga (N.P.), burying in trenches, septic tank.

5. **Personal Hygiene.**—Regularity of habits, exercise outdoor and indoor. Mental recreation—companionship, sleep, rest, holidays. Care of skin, teeth, nails, bowels. Practice of moderation and avoiding sexual irregularities. Body parasites—lice, bugs, fleas—disinfestation—relation to disease, rats and fleas in relation to plague.

6. **Clothing.**—Materials, properties, function of—best materials for tropics—errors of dress in tropics, copying heavy clothes and tight boots of Europeans. Wearing of shoes or sandals to prevent ankylostomiasis—bedding and bed clothes.

7. **Food.**—In relation to health—food in health and disease. Invalid dietaries—impurities and deficiencies in food. Dangers to health from certain food. Diseases carried by food. Avoid contamination by flies. Breeding habit of flies.

8. **Diseases.**—Epidemic, endemic, pandemic, sporadic. Infection, contagion, inoculation, incubation, infective period, segregation, quarantine, disinfection.

ELEMENTARY PHYSIOLOGY FOR NURSES.

(*Half hour once weekly.*)

TEXT-BOOK:—FOSTER & SHORES' PHYSIOLOGY FOR BEGINNERS.

First Lecture.

Blood.—Naked eye appearance—composition of—corpuscles, plasma, difference between arterial and venous—changes which occur in drawn blood, clotting. Significance of blood in certain diseases—The function of blood, *e.g.*, nourisher, aerator, excretor, etc.

Second Lecture.

Bone.—Function of different kinds. Demonstrate how body is poised—skull on vertebra, vertebra on pelvis, pelvis on leg bones. Show how fractures are caused and common positions and show function of cranium, how the vertebra protect the spinal cord, how the ribs are allowed play of movement. How pelvis is important in protecting important organs. Function of bone marrow.

Periosteum.—Growth of bone.

Third Lecture.

Joints.—Demonstrate action of each kind of joint hinge, ball and socket, also that of vertebral joints, the costo-chondral, sacro-iliac, pubis—explain function of capsule and ligaments. Show how dislocations and sprains are caused and commonest sites.

Fourth Lecture.

Muscular System.—Show action of different varieties in the living subject, how performed, controlled and antagonised, *e.g.*, flexors, extensors, rotators, supinators, abducting, adducting—demonstrate order of lever in human subject—mention voluntary and involuntary types, the expelling muscles as in bowel, bladder, uterus.

Fifth Lecture.

Cardio Vascular System.—Show and explain carefully the evidence of circulation of the blood. Function of heart, its muscle, its pericardium, its valves and that of the arteries, veins and capillaries. The *pulse*—how produced, sites at which it can be best felt.

Sixth Lecture.

Explain volume and tension, intermission. *Portal system*—its function in connection with the alimentary system.

Seventh and Eighth Lectures.

Respiratory System.—Breathing apparatus—necessity for breathing to preserve life. Changes produced in air by respiration.

Mechanism of inspiration and expiration, how muscles, ribs and diaphragm are concerned. Changes in blood in its passage through the lungs. Show how type of breathing is changed in disease or abnormality of windpipe and lungs, and how to know from rhythm and rate and character what type of affection is present. Show *sputum* and how produced—significance of different types in certain diseases. Stress necessity of sleeping with open windows and not smothered up in cloths or blankets.

Ninth and Tenth Lectures.

Alimentary System.—Explain briefly animal and vegetable foods, the *essential constituents* of a diet and the amount required daily for good health—advantages of mixed diet—preparation of food.

Short description of function of alimentary canal, beginning with the teeth and mastication, of the secreting glands connected with it, *e.g.*, mixing of food with juices in mouth, stomach and upper small intestine. Speak simply of certain changes in food in its passage along the canal and object of them, how and when absorbed—explain muscular action in peristalsis—show that liver and pancreas pour their secretion into the duodenum. Just mention nature of chyles—also function of large bowels referring to appendix—function of rectum—sphincter of anus.

Faeces.—Significance and importance of close observation of same. These will be studied visually in the excreta room.

Eleventh Lecture.

Genito-Urinary System.—Kidneys, blood supply—with changes in the blood in renal veins after the excreting of toxic products from the arteries in the kidneys. How urine is secreted, composition of urine, and the manner in which it separated from the body. Explain ureters and bladder and how the flow from kidney to bladder is accomplished and how it is hampered in disease or inflammation of kidneys.

Twelfth Lecture.

Urine.—Note colour, clarity or otherwise, deposit, odour, reaction (acid or alkaline) or if evidence of blood, bile or pus, etc.,—explain briefly phosphates and urates and how to distinguish latter from blood.

Genital.—Male. Explain function of testes, vesicules seminales, vas deferens, prostate gland and length of male urethra—liability to disease and strictures.

Female.—Explain briefly uterine function, ovarian, and the difference in bladder and urethra from the male.

Thirteenth Lecture.

The Skin, Fat and Connective Tissue.—Skin function—tactile sense, sweat glands, sebaceous glands nature of substances excreted by skin and its glands—heat of body, how and where produced—regulation of heat of body by means of skin—importance in high fevers—sweating—also cold sweats in collapse conditions

Fat.—Function of—keeps up body heat—also storage for necessary nutriment to body. Connective tissue—function of—show position of same on chart or post-mortem specimen.

Fourteenth Lecture.

Glandular system with spleen and mamma—explain function of spleen and its liability to enlargement and disease in tropical countries (malaria) function of lymphatic glands and lymphatics with special mention of liability to adenitis and elephantiasis. Mention tonsils and enlargement. Give full description of function mammary gland. Ductless glands with their internal secretion and significance can be mentioned.

Fifteenth Lecture.

Brain and Nervous System.—Simple explanation of brain mentioning centres in it for initiating and controlling all functions. voluntary and involuntary (heart action, speech, etc.,). Also the organ whence all intelligence emanates, and being the clearing house of all sensations, painful or otherwise. Mention medulla cerebellum and cranial nerve function.

Spinal Cord.—How it is the cable bearing the nerve current from the brain and distributing it through the motor spinal nerves as wires to every structure of the body and how by sensory nerve fibres a return current is borne from the periphery of the body to the brain. Illustrate motion and sensation. Function of nerve cells and nerve fibres.

Sixteenth Lecture.

Special senses, *e.g.*, of eye, ear, nose, tongue.

Eye.—Explain mechanism of eyesight with optic nerve connecting to central nervous system.

Ear.—Show mechanism of hearing on models or charts drum, ossicles, middle ear, inner ear, connecting with auditory nerve.

Nose.—Function of nose in warming and filtering air before entering lungs—as special organ of smell.

Tongue.—As organ of taste, mention papillae, glands taste buds with nervous connection to brain.

Lecture half an hour once a week, following on the Anatomy Lecture dealing with the same system—examinations after every third lecture, *e.g.*, fourth week. Course completed each six months—examination in whole subject at end and then one fortnights' rest before recommencing.

NURSING LECTURES AND DEMONSTRATIONS.

SURGICAL.

1. Explain briefly congestion, inflammations, signs of—*bedsores*, causation, preventive and curative treatment.

2. Define roughly sepsis, asepsis, antisepsis—causes of sepsis mentioning coccal organisms and tetanus—show results of infection, *e.g.*, suppuration, abscess, septicaemia, pyaemia, erysipelas. Personal cleanliness and hygiene of nurse—hand cleaning and wearing of white overalls and white shoes.

3. **Antisepsis-asepsis.**—(a) Sterilisation by heat (moist or dry) chemical antiseptics and how prepared—germicide, *e.g.*, carbolic acid in different strengths, hydrarg perchloride solution, biniodide of mercury, boracic acid, potass permanganate, eusol, iodoform, iodine, alcohol.

4. **Dressings.**—Gauze, white, double cyanide, iodoform, lint (boric, white) cotton wool, gamgee, wool. Jaconet, bandages—*swabs* preparation of—towels.

5. **Bandages.**—Roller, triangular, T. *materials* calico, linen, gauze, flannel, plaster of Paris, starch, paraffin, silicate of potash. How to apply bandages—demonstration. How to make and apply plaster jacket.

6. **Instruments.**—How to clean, sterilise, prepare for use: *sutures and ligatures*, silver wire, silk, catgut, chromic gut, silk-worm gut, horsehair, clips. Preparation and storage of above—how to set them for operation.

Drainage tubes, glass, catgut, how to clean and preserve all rubber goods including catheters (how to lay them out for use).

7. **Preparation of Theatre for Operation.**—Light ventilation, cleansing of walls and floor. Antiseptic solutions, irrigator, mackintoshes, towels, dressing tins, dressing table, dressings, swabs, gauze. tourniquet, instrument tray, ligatures, sutures, pins, rubber gloves.

Anaesthetist's Table.—Gag, tongue forceps, sponge holders, sponge bowls for vomit.

Hypodermic syringe, anaesthetics used (general or spinal or local). Stretchers to be ready, how to place on stretcher—how to place on operation table and remove therefrom on to stretchers.

8. **Preparation of Patient for Operation.**—General preparation—give confidence and ease of mind and be cheerful—general diet—purge, enema (morning of operation) cleansing and preparation of skin—scrubbing brush—bath-soap, disinfection (iodine, picric acid, crystal violet, ether alcohol)—removal of decayed teeth and sources of sepsis days before operation, mouth washes. Clean clothes on patient, clean blanket and sheet to bring into theatre—*after treatment*—Effects of anaesthetics, be prepared for vomiting, note pulse frequently, position, any pain, collapse, or haemorrhage by looking at dressings frequently. Attend to thirst.

9. **Surgical Instruments.**—Names and uses of commonest instruments required for different operations, *e.g.*, on cranium, eye, ear, nose, larynx, trachea, breast, pleural cavity, abdomen, amputations, or bone surgery of extremities, hypodermic syringes, intramuscular and intravenous syringes—how to clean and prepare. Aspirator, how to prepare and clean and store.

10. **Nursing of Surgical Cases.**—Dressings renewed or packed, cages, cradles, raising head or foot of bed, care of bladder and bowel. *Special cases: haemorrhage*, primary reactionary, secondary (arterial, venous, capillary, internal) signs of and treatment—arrest of haemorrhage by natural clotting, pressure—relation of large arteries to pressure.

11. **Wounds.**—Types—show how treated, *e.g.*, clean shave, arrest haemorrhage, antiseptics, sutures, dressings, fomentations or baths.

Burns degrees—how to remove clothing from person—how to combat shock—giving of stimulants—how to treat all degrees. Water bed.

12. **Splints.**—Kinds—wooden, poroplastic, perforated metal, Thomas's, McIntyre's, Liston's, box splint, cradle, how to pad and apply—extension apparatus how to apply—plaster jackets.

13. **Fractures.**—Simple, compound, comminuted—how to treat in emergency—how to secure immobility in easy position until seen by Medical Officer.

Dislocations and sprains—how to treat as emergencies. *Special cases* fracture of skull, pelvis, compound fractures.

14. **Massage.**—Lecture and demonstration.

15. **Preparation and Setting of Meals** for bed cases and walking cases. Diets—milk, low, medium, full.

16. **Special Nursing Functions for Senior Nurses.**—Nasal feeding, nasal douche, eye irrigation, ear syringing, rectal feeding, rectal enemata (high and low) hypodermic and intramuscular injections, catheterisation, urethral irrigation, vaginal douching indications for, technique of above and dangers.

ANATOMY.

(Half hour once weekly.)

FOR TRAINING CENTRE.

Skeleton, papier models, anatomy charts (Hrk. Lewis.)

Books.—Elementary anatomy by Henry E. Clark (Blackie & Son).

First Lecture.

A short general review of the structure of the human body.

The Structure of the Tissues.—Cells, the blood, cartilage, connective tissue, epithelium, bone, muscle, nerves, vessels (blood and lymphatic).

Second Lecture.

Osteology.—Describe each bone simply—long, short, flat giving them the common nomenclature, *e.g.*, thigh, arm, leg, etc., demonstrating on skeleton—specially demonstrate skull and vertebral column—show how vital organs are protected in bony cavities skull, chest, pelvis. Explain the skeleton as framework for softer structures to be superimposed on. Stress importance of bones of limbs and those liable to fracture. How bones are nourished. Bone marrow. Periosteum.

Third Lecture.

Joints.—Structures forming them and movements they allow of: Hinge, ball and socket, sliding joints, vertebral column joints and immovable ones of cranial bone structures, sacro-iliac and pubic. *Articular* cartilages.

Ligaments.—*e.g.*, within capsules and outside capsules

Fourth Lecture.

Muscular System.—Their arrangement and grouping as flexing, extending, pronating, adducting, abducting, etc.

Structure of muscle fibre—voluntary and involuntary. Show how voluntary attached to bone by tendon—*involuntary*, give examples, heart, bowel.

Fifth and Sixth Lectures.

Heart and Blood Vessels.—Arteries, veins, capillaries. Structure of heart, its chambers and valves—structure of and difference between arteries, veins, capillaries. Show position of largest vessels; those proceeding from and those returning to heart. Demonstrate briefly portal system and its significance.

Seventh and Eighth Lectures.

Respiratory System.—Nose, glottis, windpipe, vocal cords, lungs, pleura. Show the structure on charts or post-mortem specimens, *e.g.*, branching tree of bronchi, bronchioles and the alveoli of lungs where blood is purified.

Ninth and Tenth Lectures.

Alimentary System.—Mouth, teeth, tongue, pharynx, gullet, stomach, duodenum, small intestine, large intestine, rectum and anus. Show orifices into and out of stomach—explain liver and pancreas and their ducts opening into duodenum. Demonstrate on chart and post-mortem specimens.

Eleventh and Twelfth Lectures.

Genito-Urinary System.—Show structure roughly and blood supply of kidneys, and where they lie. Also ureters, bladders, vesiculæ seminales, vas, penis, testicles and scrotum.

Female.—Explain position and structure roughly of uterus, ovaries, fallopian tubes, vagina and vulval structures. Show on charts.

Thirteenth Lecture.

Skin, Fat and Connective Tissues.—Structure and importance of, especially as regards hypodermic injections.

Fourteenth Lecture.

Glandular System with Spleen.—Structure and position of larger lymphatic glands system and importance of lymphadenitis—mention lacteals and thoracic duct.

Spleen.—Its position, structure and importance. Mention thyroid, supra-renal and pituitary and ductless glands, their positions, show how they vary from the ordinary lymphatic glands. Give structure roughly of mammary gland.

Fifteenth Lecture.

Brain and Nervous System.—Explain position, covering membranes, convolutions, grey and white matter—mention pons, cerebellum, medulla—cranial nerves.

Spinal Cord and how it is protected in the spinal canal. Spinal nerves and how their distribution to the body generally is accomplished. Just refer to sympathetic system.

LECTURES AND DEMONSTRATIONS—TRAINING OF NURSES.

January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
<i>First Week.</i> MON. Med. Nursing. TUES. Hygiene. WED. Anatomy and Physiology. (half hour.) THURS. Demonstrations. FRI. Med. Nursing.	<i>First Week.</i> MON. Med. Nursing. TUES. Hygiene. WED. Anatomy and Physiology. (half hour.) THURS. Demonstrations. FRI. Surgical Nursing.	<i>First Week.</i> MON. Med. Nursing. TUES. Hygiene. WED. Anatomy and Physiology. (half hour.) THURS. Demonstrations. FRI. Surgical Nursing.	<i>First Week.</i> MON. Surgical Nursing. TUES. Hygiene. WED. Anatomy and Physiology. (half hour.) THURS. Demonstrations. FRI. Med. Nursing.	<i>First Week.</i> MON. Surgical Nursing. TUES. Hygiene. WED. Anatomy and Physiology. (half hour.) THURS. Demonstrations. FRI. Med. Nursing.	<i>First Week.</i> MON. Surgical Nursing. TUES. Hygiene. WED. Anatomy and Physiology. (half hour.) THURS. Demonstrations. FRI. Surgical Nursing.						
<i>Second Week.</i> MON. Med. Nursing. TUES. Demonstrations. WED. Anatomy and Physiology. (half hour.) THURS. Demonstrations. FRI. Med. Nursing.	<i>Second Week.</i> MON. Med. Nursing. TUES. Demonstrations. WED. Anatomy and Physiology. (half hour.) THURS. Demonstrations. FRI. Surgical Nursing.	<i>Second Week.</i> MON. Med. Nursing. TUES. Demonstrations. WED. Anatomy and Physiology. (half hour.) THURS. Demonstrations. FRI. Surgical Nursing.	<i>Second Week.</i> MON. Surgical Nursing. TUES. Demonstrations. WED. Anatomy and Physiology. (half hour.) THURS. Demonstrations. FRI. Med. Nursing.	<i>Second Week.</i> MON. Surgical Nursing. TUES. Demonstrations. WED. Anatomy and Physiology. (half hour.) THURS. Demonstrations. FRI. Med. Nursing.	<i>Second Week.</i> MON. Surgical Nursing. TUES. Demonstrations. WED. Anatomy and Physiology. (half hour.) THURS. Demonstrations. FRI. Surgical Nursing.						
<i>Third Week.</i> MON. Med. Nursing. TUES. Hygiene. WED. Anatomy and Physiology. (half hour.) THURS. Demonstrations. FRI. Med. Nursing.	<i>Third Week.</i> MON. Med. Nursing. TUES. Hygiene. WED. Anatomy and Physiology. (half hour.) THURS. Demonstrations. FRI. Surgical Nursing.	<i>Third Week.</i> MON. TUES. { Examination WED. { in subjects of THURS. { whole course FRI. { up to date.	<i>Third Week.</i> MON. Surgical Nursing. TUES. Hygiene. WED. Anatomy and Physiology. (half hour.) THURS. Demonstrations. FRI. Med. Nursing.	<i>Third Week.</i> MON. Surgical Nursing. TUES. Demonstration in Hygiene. WED. Anatomy and Physiology. (half hour.) THURS. Demonstrations. FRI. Surgical Nursing.	<i>Third Week.</i> MON. Examination, Close of Session.						
<i>Fourth Week.</i> MON. Med. Nursing. TUES. Demonstrations. WED. { Examination THURS. { written or oral FRI. { on subjects { lectured on during the month.	<i>Fourth Week.</i> MON. Med. Nursing. TUES. { Examination WED. { written or oral THURS. { on subjects FRI. { lectured on during the month.	<i>Fourth Week.</i> MON. TUES. { No Lectures. WED. { THURS. { FRI. { First Session	<i>Fourth Week.</i> MON. Practical. TUES. Demonstrations. WED. { Examination THURS. { on above three FRI. { weeks work.	<i>Fourth Week.</i> MON. { Demonstration. TUES. { tions. WED. { Oral or written THURS. { Examination FRI. { on above three { weeks work.	<i>Fourth Week.</i> No Lectures						
							Whole syllabus gone	through again as in 1st	Session commencing 1st	week in July	
								No lectures last two weeks of September.			No lectures last two weeks of December.

Sixteenth Lecture.

Special organs : eye, ear, nose, tongue.—Describe structure of each by dissecting sheep or ox eyes and by models of two latter.

Examinations oral or written after each third lecture. Course completed in twelve weeks. Full examination at end of this time—rest of one fortnight—then commence course again.

TRAINING OF MIDWIVES.

References—(1) SYLLABUS AND TEXT-BOOKS.

(2) SUBJECTS FOR EXAMINATION FOR CERTIFICATE.

(3) MIDWIVES ORDINANCE.

(4) STANDARD EQUIPMENT OF TRAINING CENTRE.

Steps will be taken to pass a Midwives Ordinance for Nigeria on the lines of that adopted by the Uganda Protectorate. This will legalise the position of certified midwives.

2. Pupil midwives to pass Standard VI in the Southern Provinces—the optimum recruiting age will be the school-leaving age not excluding, however, likely candidates of more mature age who have an approved standard of education.

3. **Length of Training.**—Two and a half years—to include the six months preliminary course in general nursing. This for the Certificate.

4. The title given to those enrolled in the Training Centres will be pupil midwives.

5. **Preliminary Course of General Nursing.**—The Sub-Committee is agreed that the full six months' course of general nursing should be gone through at an approved African general hospital. After passing the examination at the end of the Session (practical tests being those most stressed and the standard for pass somewhat lowered from the fifty *per cent.* marks) the pupils are passed on to the recognised Midwifery Training Centres, *e.g.*, Massey Street, Abeokuta and C.M.S. Hospital, Iyieniu.

6. **Times of Enrolment.**—No pupil midwife to be enrolled except at the beginning of definitely appointed sessions. These sessions should be twice yearly for the commencement of the General Nursing Course, *e.g.*, January and July.

7. The standard syllabus adopted has been that of the Uganda Protectorate. The whole course should be gone through in one year with oral and written examinations each three months in the specific subjects of Midwifery and Infant Welfare with a complete examination on the whole subjects at the end of the year. The syllabus will be gone through completely twice in the course of the two years training.

8. Lectures to be given twice weekly to each group of pupils dealing with the juniors in an elementary fashion in classes of their own, the more senior groups should be combined in one class as much as possible. These lectures will be delivered by the Lady Medical Officer and the Nursing Sister—there should be practical demonstrations daily.

9. **Use of Text-books.**—To be discouraged except to the last year pupils. Standard text-book recommended is that of Dr. Albert Cook's, to be translated into English.

10. **Training in Infant Welfare Work.**—Should be associated with that of midwifery. While midwifery should be taught by the Lady Medical Officer at the Training Centres, the pupil midwives should in addition attend the Infant Welfare Clinics.

11. The composition of the Examining Board should follow on main lines the same body as functioning in Uganda. The examination to be in those subjects as laid down in the syllabus of the Uganda Protectorate including the general nursing, hygiene of that syllabus—the anatomy and physiology of the female pelvis and structures allied thereto.

12. All pupil midwives should be indentured after passing the examination in general nursing and before being enrolled as pupil midwives.

13. It is proposed to institute later a diploma on higher lines as has been adopted in Uganda with the same conditions as to added training and competency, deleting, however, the clause allowing instrumental practice in difficult labours.

14. **Training of Third-grade.**—The training of a lower grade tribal midwife for one year on the lines of "Sudan illiterates" is under consideration. This will be undertaken by Native Administration Dispensary and Training Centres only.

TRAINING OF MIDWIVES.

SYLLABUS OF TRAINING FOR THE EXAMINATION FOR THE CERTIFICATE.

(a) *General Nursing.*—Reception of the sick in hospital, undressing and washing the patient. Hospital clothing. Care of patient's property. Feeding the patient. Prevention of infection of bedstead and bed-clothes by vermin. Draw sheet. Pulse. Respiration. Temperature recording on charts. Feeding cup. Cleansing mouth of patient. Hot water bottle. Urine bottle. Bed pan. Douche pan. Hypodermic injections. Prevention and treatment of bed sores. Enemata. Rectal saline. Catheter. Movement of patient from bed to bed. Invalid cooking, necessity for cleanliness of nurse, patient, bed and ward.

(b) *Pharmacy.*—Weights and measures. Use of simple drugs. Preparation of stock mixtures. Precautions as to lotions. Poisons.

(c) *General instructions in disciplinary matters.*—Relations and behaviour with Europeans. Obedience. Punctuality. Willingness. Replying by question. Ready acceptance of reproof. Sulking. Responsibility for patients in charge and any accidents that may occur to them, also for all articles in charge.

Striking or ill-treating the sick. Malpraxis. Liability of medical attendant to the charge of manslaughter owing to neglecting to follow instructions. Varying medical treatment prescribed by medical officers. Selling medicines, etc., extorting money from sick persons.

(d) The elementary anatomy and physiology of the female pelvis and its organs.

(e) *Pregnancy:*—

- | | |
|--|-----------------------|
| (i) Its hygiene; | both in relation to— |
| (ii) Its diseases and complications, including abortion; | |
| | (a) the mother, |
| | (b) the unborn child. |

(f) The symptoms, mechanism, course and management of natural labour. The use of ergot.

(g) The signs that a labour is abnormal.

(h) Haemorrhage: its varieties and the treatment of each.

(i) Antiseptics in midwifery and the way to prepare and use them.

(j) The management of the puerperal patient.

(k) The management (including the feeding) of infant.

(l) Signs of the diseases which may develop during the first ten days, especially opthalmia, including its treatment.

(m) The duties of the midwife as described in regulations, including proper manner of keeping the register, keeping records, etc.

(n) Obstetric emergencies, and how the midwife should deal with them. This will include some knowledge of the drugs commonly needed in such case, and of the mode of their administration.

(o) Puerperal fevers, their nature, causes and symptoms.

(p) The venereal diseases (syphilis and gonorrhoea) in relation to their signs, symptoms, and dangers in women and children and to the risks of contagion to others, the dangers of mercury in large doses.

- (q) The disinfection of person, clothing, and appliances.
- (r) Elementary physiology, and the principles of hygiene and sanitation as regards home, food, and person. Flies, vaccination, disposal of excreta.
- (s) The examination of urine.
- (t) The care of children born apparently lifeless.

STANDARD EQUIPMENT OF TRAINING CENTRES FOR NURSES, MIDWIVES, ASYLUM ATTENDANTS.

C. BAKER, 244 HIGH HOLBORN.

		£	s.	d.
B. 3 Brain—Natural size—Can be disarticulated—	Asylum Attendants Centre	1	16	0
Origins of nerves				
B. 10 Two models—Origins of nerves in spinal marrow...		1	4	0
C. 14 Eye—Horizontal section through eye 10 times enlarged		1	4	0
D. 2 Ear—3 times enlarged—Can be disarticulated into anvil, malleus, stapes and membrana tympani	Training Centre for Nurses	1	15	0
J. 12 Circulation of the blood shown on a board—Schematically represented		1	17	0
O. 4 Male Figure 3 feet 6 inches high Covering of Thorax and abdomen can be taken off—Stomach lungs and heart made to open		16	18	6
L. 11 Female pelvis—Laterally prepared, uterus, bladder and exterior genitals are opened and can be disarticulated	Training Centre for Midwives	2	7	6
L. 26 Foetal doll with umbilical Cord and Placenta (Leather)		2	10	0
Natural female pelvis with femur heads ligaments, and foetal skull. Obstetrical charts		3	18	6

MILLIKIN & LAWLEY, 165 STRAND.

Articulated Skeletons—Superior quality finely articulated ...	12	12	0
Phillips Life size Anatomical Model of Human body—coloured plates approximately coloured pieces of heavy paper which fold into place in the model	3	3	0
St. John's Ambulance Association Lecture Diagrams ...	13		6

TRAINING OF LABORATORY ATTENDANTS.

4.—SYLLABUS.

Standard of Education.—Candidates to possess a recognised Sixth Standard Certificate or Class IV middle school and to be verified by the Education Department. After personal interview by Pathologist a candidate may be accepted for training as a laboratory attendant and must start from the beginning in the laboratory. Financial provision for 1930-31 will have to come under heading Nurses-in-training, as no provision for separate Laboratory Attendants-in-training as a separate entity has been budgetted for.

FIRST YEAR.

During the first and second months to act as laboratory servants.

- general cleanliness of apparatus;
- routine procedure of receiving and registration of specimens for examination;
- acquaintance with laboratory equipment;
- disposal of used specimens;
- a short lecture once weekly on the meaning and importance of laboratory work.

Third and fourth months.

In addition to the above—

- anatomy demonstrations in connection with post-mortem work;

- (b) weights and measures; the metric system; centrifuge;
- (c) recording of results in books. Elementary statistics and percentages;
- (d) the use of the microscope, excluding oil immersion lens, and demonstration of urine sediments—*filaria*.
- (e) keeping of notebooks and recording personal observations;
- (f) lectures on—
 - (i) elementary anatomy;
 - (ii) faeces, urine and the larger blood parasites.

During the next eight months, the work to be a repetition of the first four months.

Examination at the end of the year.

Indenturing after six months' probation.

SECOND YEAR.

- (a) post-mortem work—removing, weighing and preserving tissues—care of gloves, boots and aprons—cleaning of post-mortem instruments; recognising gross pathological lesions;
- (b) preparation of fresh and stained smears in the laboratory;
- (c) the use of the centrifuge and general examination of urine—
 - (i) macroscopically;
 - (ii) microscopically.
- (d) the cleaning and sterilising of glassware;
- (e) lecture—demonstrations bearing on the above at suitable intervals;
- (f) all second year laboratory attendants-in-training to attend the first year lectures.

Session examination at the end of second year.

THIRD YEAR.

- (a) the histology and physiology of the blood—
 - (i) making thick and thin films;
 - (ii) examination of blood in fresh and stained films.
- (b) faeces for ova and protozoa (oil immersion where necessary);
- (c) staining, by the common methods, of—
 - (i) sputum;
 - (ii) blood;
 - (iii) pus;
 - (iv) urine deposits.
- Stains*.—Leishman, Giemsa, Gram, carbol thionin, methylene blue and Z. Neillsen.
- (d) very elementary bacteriology;
- (e) frequent lecture—demonstrations on the above as pathological material permits.

Examination for Promotion to Third-class Laboratory Attendant.

Third-class Laboratory Attendants.

- (a) the study for two months each of—
 - (i) blood films;
 - (ii) stools;
 - (iii) urines;
 - (iv) pus and sputum smears.

The above to be for independent observation and subject to confirmation by the Pathologist.

- (b) independent post-mortem work;
- (c) constant repetition of (a).

Examination for Promotion to Second-class Laboratory Attendant to be almost entirely practical.

Second-class Laboratory Attendants or Third-class who have passed the qualifying examination.

- (a) preparation of sections and section-cutting, sharpening and care of knives—use of microtome—staining of sections by the commoner methods;
- (b) media making;
- (c) elementary bacteriology including the plating of stools and urines;
- (d) taking of blood and separation of serum for Kahn and Widal tests;
- (e) care of laboratory animals.

Promotion to first-class laboratory attendant and senior laboratory attendant dependent upon personal efficiency and the ability to maintain proper discipline no less than upon passing an examination of practical efficiency to be held by the staff of Pathologists.

Suggested that no text-books be allowed.

Text-book.—Medical laboratory methods by French and Nuthall if sanctioned.

It is suggested that all second-class laboratory attendants should acquire their knowledge of section-cutting at the Medical Research Institute, Yaba, or at other laboratories where there are qualified technicians to teach the art.

We wish to bring to the notice of the Committee the fact that the work of laboratory attendants at Yaba must, of necessity, be strictly limited. The delicacies of research require that such work is so personal for the sake of obviating errors that the laboratory attendant can be little more than a 'handmaid'. Dr. Connal, reviewing the new proposed scheme for a laboratory service, is of the opinion that six instead of nine laboratory attendants be posted to the Medical Research Institute, viz., two second-class for the Vaccine laboratory and four third-class elsewhere. The remaining three to be absorbed in the new Lagos laboratory which would provide more material, and consequently more teaching of the principles of clinical pathology, which, after all is going to be of the most use to the laboratory attendant, and particularly for purposes of promotion.

We wish to stress the importance of the keeping of notebooks throughout the entire course of training and up to promotion to second-class laboratory attendant. Notebooks to be examined at the end of each month.

COMMITTEE.

(Sgd.) A. CONNAL,
 ,, HENRY MORRISON,
 ,, E. C. SMITH.

SYLLABUS FOR TRAINING OF LABORATORY ATTENDANTS.

	FIRST YEAR.	SECOND YEAR.	THIRD YEAR.
1st and 2nd Months.	<p>(a) General cleanliness of apparatus.</p> <p>(b) Routine procedure of receiving and registration of specimens for examination.</p> <p>(c) Acquaintance with laboratory equipment.</p> <p>(d) Disposal of used specimens.</p> <p>(e) A short lecture once weekly on the meaning and importance of laboratory work.</p>	<p>(a) Post-mortem work—removing, weighing and preserving tissues—care of gloves, boots and aprons. Cleaning of P.M. instruments. Recognising gross pathological lesions.</p> <p>(b) Preparation of fresh and stained smears in the laboratory.</p> <p>(c) The use of the centrifuge and general examination of urine.</p> <p>(1) Macroscopically.</p> <p>(2) Microscopically.</p> <p>(d) The cleaning and sterilising of glassware.</p> <p>(e) Lecture—demonstrations bearing on the above at suitable intervals.</p> <p>(f) All second year laboratory Attendants-in-Training to attend the first year lectures.</p>	<p>(a) The histology and physiology of the Blood making thick and thin films. Examination of blood in fresh and stained films.</p> <p>(b) Faeces for ova and protozoa (oil immersion where necessary).</p> <p>(c) Staining by the common methods, of</p> <ol style="list-style-type: none"> 1. Sputum 2. Blood 3. Pus 4. Urine deposits. <p>Stains. Leishman, Giemsa, Grain, Carbol Thionin Methylene Blue and Z. Neilsen.</p> <p>(d) Very Elementary Bacteriology.</p> <p>(e) Frequent lecture—demonstrations on the above as pathological material permits.</p> <p>Examination for promotion to 3rd Class Laboratory Attendant.</p>
3rd and 4th Months.	<p>In addition to the above.</p> <p>(a) Anatomy demonstrations in connection with Post Mortem work.</p> <p>(b) Weights and Measures—the Metric System; centrifuge.</p> <p>(c) Recording of results in books—Elementary Statistics and percentages.</p> <p>(d) The use of the microscope (Excluding oil immersion lens) and demonstration of OVA urine sediments—filaria.</p> <p>(e) Keeping of note books and recording personal observations.</p> <p>(f) Lectures on (1) Elementary Anatomy (2) faeces urine and the larger blood parasites.</p>		
5th-12th Months.	<p>Repetition of the first four months.</p> <p>Examination at the end of the year.</p>		

Syllabus for Third-class Laboratory Attendants.

FOURTH YEAR.

First and second month—

(a) blood films;

Third and fourth month—

(b) stools;

Fifth and sixth month—

(c) urines;

Seventh and eighth month—

(d) pus and sputum smears.

The above to be for independent observation and subject to confirmation by the Pathologist.

Ninth to twelfth month—

(i) independent post-mortem work;

(ii) constant repetition of the first eight months' work.

Examination for promotion to second-class laboratory Attendant to be almost entirely practical.

Syllabus for Second-class Laboratory Attendants.

(a) Preparations of sections and section-cutting—sharpening and care of knives—use of microtome staining of sections by the commoner methods.

(b) Media making.

(c) Elementary bacteriology including the plating of stools and urines.

(d) Taking of blood and separation of serum for Kahn and Widal tests.

(e) Care of laboratory animals.

Promotion to first-class laboratory attendant and senior laboratory attendant solely dependent upon personal efficiency and the ability to maintain proper discipline among the junior laboratory attendants.

TRAINING OF DISPENSERS.

Sub-Committee—DR. L. WYNNE DAVIES, A.D.M.S.

„ H. H. STEWART, Specialist.

„ G. TAYLOR, Supt., Pharmacy School.

MR. ARTHUR, Asst Supt., Pharmacy School.

MR. McCOWAN, Education Department.

The Sub-Committee agree that:—

1. The present syllabus, as at present enforced at the School of Pharmacy, Lagos, in the three years' course is admirably suited to its purpose as regards the pupils of the Southern Provinces of Nigeria.

2. That it is inadvisable to lower the standard or modify the syllabus for pupils of the Northern Provinces but that the present syllabus should be presented in a more elementary manner for a time.

3. That the use of Latin should be simplified to the utmost possible and that English be substituted where feasible without ruthlessly cutting across old established routine. That such Latin as is required can be taught in the Pharmacy School with the aid of Professor Ince's manual.

4. As regards the teaching of elementary chemistry in the upper middle schools and in providing a suitable syllabus to conform to the rules and standards of the Pharmacy School, Mr. McCowan says that chemistry and science will be taught only to Classes V and VI of those schools and that pupils for the Pharmacy School will come after passing out of Class IV.

5. The Text-books used at the school of pharmacy are well-suited to their purpose, having been selected after long thought and experience. Those books are bought by students at the C.M.S. Bookshop—the list will be given by the Superintendent.

6. The Government Dispensers after qualifying will be posted to a Training Hospital where a course of clerking—account-keeping and preparing indents will be gone through.

7. **Entrance Examination.**—Latin as a subject for this examination is excluded. English and mathematics are the definite subjects required.

8. The course at the Pharmacy School is completed in three, years, with revision and examinations in the last six months.

LIST OF BOOKS FOR THE USE OF STUDENTS.

Dispenser's Syllabus.

	£	s.	d.
British Pharmacopeia	0	10	6
Text-book of Botany (Lowson)	0	9	6
Heat and Light (Jones)	0	4	0
Art of Dispensing	0	9	6
A Manual of Chemistry, Volume I.	0	11	6
A Manual of Chemistry, Volume II.	0	6	0
Elementary Physics, first year	0	2	0
Elementary Physics, second year	0	2	6
Latin Grammar of Pharmacy (Ince)	0	7	6
Southall's Materia Medica	0	12	6
Essentials of Pharmacy	0	5	6
Will's Practical Analysis	0	5	0
The Nigerian Exercise Book 7A, one dozen	0	12	0
Total	£4	17	6

Chemist and Druggist Syllabus.

In addition to the above list—

Greenish Materia Medica;
British Pharmaceutical Codex;
Practical Pharmacy (Lucas & Stevens);
Inorganic Chemistry (Newth).

REPORT OF SUB-COMMITTEE
ON
TRAINING OF SANITARY INSPECTORS.
A.—NORTHERN PROVINCES.

All candidates should if possible read and write English. English is necessary for their work as well as to enable them to get promotion.

English is essential for Police Court work. Ex-non-commissioned officers are not considered suitable for Sanitary Inspectors.

They should if possible be recruited from Provincial Schools and the assistance of the Education Authorities should be sought whenever possible. When Katsina is a middle school recruits should be obtained from there. The Sanitary Inspectors for the Northern Provinces should be recruited locally from the district where they are likely to be working. It is not considered desirable that boys from the Northern Provinces should be trained in Lagos.

It is considered desirable that there should be one training centre for the Northern Provinces and it should be at Kano.

The teaching staff to consist of—

- (i) Medical Officer of Health;
- (ii) Two European Sanitary Inspectors.

Buildings at Kano.—At present there is the office of the Medical Officer of Health, a laboratory and a sanitary inspector's office. Not budgetted for until 1931-32.

Two more rooms are required as school-rooms:—

17' × 26' *Total cost £390. Concrete floor, mud*
17' × 34' *building with cement facing.*

Desks and chairs for twenty pupils.

Black-board.

Chalks.

Black-board compass.

Diagrams.

Syllabus of lectures (Northern Provinces).

One hour of English per week is considered desirable if it could be arranged with the Education Department. A syllabus of lectures on the lines of that in Lagos is recommended but simplified.

The following is considered suitable:—

I.—Elementary Parasitology:—

Diseases caused by and preventive measures against (1) lice; (2) fleas; (3) guinea-worm; (4) hook-worm; (5) tape-worm; (6) bilharzia.

II.—Elementary Entomology:—

1. *House fly*—Life history of—diseases caused by. How to get rid of breeding places.
2. *Tsetse fly*—How to get rid of—diseases caused by.
3. *Mosquitoes*—Breeding places. Recognition of larvae and how they may be destroyed. How to prevent breeding mosquitoes. How a danger to health—recognition of adults—diseases caused by.

III.—(a) **Infectious Diseases**—prevention against and means to prevent spread of smallpox, chicken-pox and relapsing fever; plague, cerebro-spinal meningitis, dysentery; quarantine, isolation, segregation.

(b) **Other diseases**—prevention against—malaria, sleeping sickness, yellow fever, tuberculosis.

IV.—**Disinfectants and Disinfection** :—

(a) natural disinfectants;

(b) physical disinfectants;

(c) chemical disinfectants;

(d) means of disinfection (fumigation, spraying, steam).

V.—**Refuse** :—

How a danger to health. Its removal and destruction.

VI.—**Night Soil** :—

Removal and disposal.

VII.—**Sanitation** as applied to villages in the tropics. Salgogi described.

VIII.—**Public Health Ordinance, 1917** :—

Rules and Regulations made thereunder. (A working knowledge of).

IX.—**Water** :—

Sources of supply, e.g., rain, spring, upland surface, river, well.

How water supply may be polluted. Means of prevention of pollution and purification.

X.—**Air and Ventilation** :—

Principles of ventilation and simple methods of ventilating living rooms and schoolrooms.

Size of windows. Danger of overcrowding. Air space for each person.

XI.—**Buildings** :—

Requirements of a good house.

XII.—**Rat Destruction** :—

Necessity for. Relation to infectious disease.

XIII.—**Food and Meat Inspection**.

XIV.—**Methods of Inspection** (*including prevention and abatement of nuisances*):—

Water, houses, compounds, mosquito-breeding, streets, lands, latrines, foreshore, dumping grounds, trenching grounds, offensive trades, bake-houses, corn-mills, tanneries, markets, keeping of animals, slaughter-houses, canoes, etc.

XV.—**Clerical Duties in the Public Health Office**.

XVI.—**Procedure in Police Court Cases**.

XVII.—**Vital Statistics**—Importance of.

Text-books.—Evan's Hygiene.

Part II of Dr. Blacklock's Book are considered sufficient at present with notes and plenty of diagrams and models, the latter being considered most important.

Length of Training.—It was agreed that the course of training should be two years, with class examinations held frequently to ascertain how candidates are progressing. If satisfactory progress is not being made by any Inspector his services should be terminated.

Certificate of the Royal Sanitary Institute.

It was agreed that if a candidate was sit for the local examination of the Royal Sanitary Institute, he would have to be brought to Lagos. This would only apply to men of outstanding merit, and recommended by Senior Sanitary Officer, Northern Provinces.

If possible a Sanitary Inspector in the Northern Provinces should be sent to Kano for a short three months' revision course every four years.

B.—SOUTHERN PROVINCES.

It was decided that the present course of training of two years' theoretical and practical in Lagos and one year's practical training in Lagos or elsewhere should be adhered to. In order to fit in with the course of training it was decided that as far as possible Sanitary Inspectors-in-Training should be appointed in July every year commencing in July, 1931. Examination to be held at the end of two years in July. Frequent Class examinations—oral—every three months—should be held to ascertain how candidates are progressing. If satisfactory progress is not being made, action should be taken to have the services of the Sanitary Inspectors-in-Training terminated. An examination will be held in July, 1930, after the examination of the Royal Sanitary Institute for the boys at present in training.

Although the opinion of the Sub-Committee was not altogether in favour of promoting a Sanitary Inspector-in-Training to second-class if he gains seventy-five *per cent.* of the available marks in the examination, it was decided not to alter the arrangement as it had been approved by the Secretary of State, and had been adopted by the Town Council. If at the end of three years' training, the Sanitary Inspector-in-Training gets fifty *per cent.* marks, he is promoted to third-class. It was agreed that Sub-Inspectors of sanitation should be replaced by Sanitary Inspectors-in-Training wherever possible. No new Sub-Inspectors are being taken on non-pensionable staff.

With regard to the standard of education required it was decided that no candidate should be appointed below Form I, Secondary or Class IV Upper Middle School.

If possible a higher standard should be sought after. The accommodation at the Health Office is sufficient at present.

The Text-book recommended is—McNally's Sanitary Handbook for India.

Numerous diagrams and models are at present in use in the Health Office.

The teaching is carried out by Dr. Oluwole, Medical Officer of Health and the European Sanitary Inspectors. There is sufficient equipment for present requirements.

The syllabus laid down is as follows:—

SYLLABUS FOR SANITARY INSPECTORS-IN-TRAINING.

I.—Elementary Parasitology:—(*Brief life history with special reference to diseases caused.*)

Lice, fleas, flukes, guinea-worm, hook-worm, ascaris, human tape-worms.

II.—Elementary Entomology:—

1. The house-fly; its life history; diseases caused by it; how to get rid of it.
2. The tsetse fly; its life history; how a danger to health.
3. Mosquitoes; their breeding places; the recognition of the water stages and how these may be destroyed; how a danger to health; the recognition of adult culex; anopheles and stegomyia.

III.—Communicable and Epidemic Disease:—(*including some knowledge of the preventive methods against infection.*)

Plague, yellow-fever, smallpox, chicken-pox, malaria, tuberculosis, sleeping sickness, relapsing fever, dysentery, cerebro-spinal meningitis, ankylostomiasis, leprosy, enteric fever, quarantine, segregation, isolation.

IV.—Disinfectants and Disinfection :—(*including care of sanitary appliances.*)

Natural disinfectant, physical disinfectants.

Chemical disinfectants, e.g., sulphur dioxide, formaldehyde, cyllin, lysol, carbolic acid.

Practical disinfection, fumigation and spraying; steam disinfection.

V.—Refuse :—

How a danger to health; its removal and destruction; clearing premises and land.

VI.—Night Soil :—

Removal and disposal.

VII.—Sanitary Law :—

A working knowledge of the Public Health Ordinance (1917), and the Rules and Regulations made under it.

VIII.—Water :—

Physical characteristics of good drinking water.

Quantity of water required for each person; sources of water supply, e.g., rain water, springs, wells, rivers and upland surface waters; the various ways in which it may be polluted during collection, storage and distribution, and the means of preventing such pollution.

Filters, hard and soft waters. Chlorination, softening and other purifying processes. The requirements and supply of towns and villages. Mains, pipes, fittings and storage. The taking of water samples.

IX.—Air and Ventilation :—

The composition of air and the various causes of deterioration; sources of pollution; quantity required. The principles of ventilation and simple methods of ventilating rooms; public buildings; schools, etc. Overcrowding. Air space surrounding buildings: size of windows.

X.—Dwellings :—

Requirements of a good house; sanitary defects in and around buildings, and their remedies.

XI.—Rat Destruction :—

Rat-runs, and the closing of such with cement or otherwise.

XII.—Meat Inspection :—(*including examination of live cattle.*)

An elementary knowledge of the following diseases:—tuberculosis, pneumonia, strongyli, pleurisy, flukes, septicaemia, abscesses, rinder-pest, anthrax, scabies.

XIII.—Food Inspection :—

Characteristics of good and bad food (e.g., meat, fish, milk, milk products, vegetables and fruit). Inspection of rice, flour, gari, elubo, maize and other foods, tinned foods.

XIV.—General Inspection :—(*including prevention and abatement of nuisances.*)

Especially in connection with water, houses, compounds, mosquito-breeding, streets, lands, latrines, foreshore, dumping grounds, trench grounds; also in connection with trades; bake-houses, corn-mills, tanneries, fish-curing, public markets, sale and storage of fresh provisions, keeping of animals, slaughter-houses, canoes, workshops, schools.

XV.—Vaccination :—

Theoretical and practical.

XVI.—Clerical Duties in a Public Health Office :—

Keeping, issuing and checking of stores; keeping of sanitary books and records.

XVII.—Police Court—in relation to the duties of a Sanitary Inspector. Notices and summonses.

XVIII.—Vital Statistics :—

Elementary knowledge of the terms and of the methods of calculating birth-rate, death-rate, and rate of infant mortality.

XIX.—Elementary Meteorology :—

Thermometers; rain gauge.

XX.—Principles for Calculating Areas—Cubic spaces, the interpretation of and elementary drawing of plans to scale.

XXI.—Proper Conditions of Good Drainage:—

An elementary knowledge of various systems of drainage and their adaptability to particular conditions. Disposal of surface and rain water. The advantages and disadvantages of various sanitary appliances for houses, methods of drain testing.

XXII.—Sanitation—as applied to villages in the tropics.

XXIII.—Practical Demonstrations in the laboratory are given.
Syllabus passed in General Committee on 16th December, 1929.

SYLLABUS FOR TRAINING OF DISPENSARY ATTENDANTS.

To be purely practical—and given by Medical Officers, European Nursing Sisters and Charge Nurses in the Out-patient Departments of the Hospitals where training centres are to be set up. Age between eighteen and twenty-five years, except for Native Administration Attendants already established.

TRAINING TO BE STANDARDISED.

All Treatment to be according to Standard Plan.

- (1). How to elicit information from the patient regarding his illness.
- (2). Personal cleanliness, washing and sterilising of hands, use of nailbrush, use of clean clothes, and wearing of shoes or sandals and use of clean water in diluting lotions or in diluting medicines. Stress the boiling of water.
- (3). Showing how to clean bowls, trays, instrument tray, medicine gallipots and spoons, and how to prepare and dilute the lotions and solutions provided for use. Also the strength of permanganate solutions by depth of colour.
- (4). To know the imperial measures of capacity with signs for drachm, ounce, pint and gallon.
- (5). How to measure out and give medicines, and clean measures after use.
- (6). The necessity of shaking stock mixtures before pouring out doses.
- (7). How to prepare and apply fomentations.
- (8). How to become acquainted with different kinds of dressings in the standard list, how to sterilise and keep them clean in dressing tins.
- (9). How to apply dressings and do simple bandaging.
- (10). How to apply ointments, use liniments.
- (11). How to sterilise skin—iodine, or hot water with special reference to intramuscular injections.
- (12). How to spot commonest diseases which they probably already know by sight, e.g., yaws, syphilis, leprosy—also epidemic diseases such as smallpox, chicken-pox, cerebro-spinal meningitis, relapsing fever.
- (13). Showing how to treat clean wounds and how to stitch.

(14) How to treat septic wounds, ulcers, especially phagedenic ulcers, specially stress treatment for guineaworm—clean septic cases.

(15). How to spot a temperature by feel, look, quickened pulse. breathing. Use of thermometer.

(16) How to sterilise instruments (standardised set) probes, scissors, forceps, needles, hypodermic and intramuscular syringes, especially how not to break syringes and how to store after use.

(17). How to give intramuscular injections and sites to be used, e.g., for yaws, syphilis, leprosy, amoebic dysentery (emetine) on the direction of Travelling Medical Officer only.

(18). How to wash eyes and syringe ears.

(19). How to treat burns—Carron oil.

(20). How to stop bleeding by learning the pressure points and putting on pressure bandage as a tourniquet. Dangers of tourniquet.

(21). How to treat snake bite and scorpion sting by scarification with pot. permang. and very hot water baths.

(22). How to spot worms and give appropriate medicines.

(23). How to irrigate urethra for gonorrhoea—standard permanganate.

(24). How to examine stools—and note diarrhoea, dysenteries, worms.

(25). How to examine urine—naked eye appearances, also presence of blood at end of micturition—schistosomiasis.

(26). How to take a blood slide for Travelling Medical Officer.

(27). How to pad and use a simple splint.

(28). How to record the simple diseases seen in the standard register.

(29). Doses of medicine in relation to age.

Age.	Adult.	12 years.	4 years.	2 years.	9 months to 1 year.
Doses.	1	$\frac{1}{2}$	$\frac{1}{4}$	$\frac{1}{8}$	$\frac{1}{16}$

(30). All stock bottles to be clearly and adequately labelled, with definite instructions as to the amount of dilution required. Label should have also an appropriate number in big letters. Printed labels will be available from the School of Pharmacy, Lagos.

The tuition to be repeated again and again for a year until proficiency is attained. Examination at the end of this period by Assistant Director of Medical Service and Medical Officer of Training Centre.

N. A. DISPENSARIES—OUT-PATIENTS' REGISTER.

-
- | | |
|---|--|
| 1. Relapsing fever. | 28. Ascaris. |
| 2. Malaria. | 29. Dracunculus medinensis
(guinea-worm). |
| 3. Smallpox. | 30. Arthritis. |
| 4. Chicken-pox | 31. Chronic rheumatism. |
| 5. Influenza. | 32. Gonorrhoea. |
| 6. Trypanosomiasis. | 33. Orchitis and epididymitis. |
| 7. Cerebro spinal meningitis. | 34. Hydrocele. |
| 8. Dysentery. | 35. Vaginal discharge,
leucorrhoea. |
| 9. Leprosy. | 36. Abortion. |
| 10. Yaws. | 37. Boil. |
| 11. Syphilis. | 38. Abscess. |
| 12. Conjunctivitis. | 39. Ulcer. |
| 13. Other eye diseases. | 40. Scabies—crawl-crawl. |
| 14. Otitis media. | 41. Other skin diseases, tinea, etc. |
| 15. Other diseases of ear, wax,
etc. | 42. Lymphadenitis, buboes. |
| 16. Cough. | 43. Elephantiasis. |
| 17. Pneumonia. | 44. Chigoes (S. Prov.). |
| 18. Tuberculosis of lungs. | 45. Snake bite. |
| 19. Diseases of teeth and gums. | 46. Scorpion sting. |
| 20. Dyspepsia. | 47. Burns. |
| 21. Diarrhoea—Infants. | 48. Wounds. |
| „ —Adults. | 49. Fractures. |
| 22. Constipation. | 50. Tumours. |
| 23. Haemorrhoids. | 51. Paralysis. |
| 24. Jaundice. | 52. Mania. |
| 25. Dropsy, ascites. | 53. Poisoning—native medi-
cines, juju obsessions |
| 26. Hernia, inguinal and
umbilical. | 54. Fits, epilepsy. |
| 27. Taenia. | 55. Tetanus. |

STANDARD EQUIPMENT—NATIVE ADMINISTRATION DISPENSARIES.

MIXTURES, LINAMENTS, OINTMENTS.

1. *Lin. Terebinth*—To be imported.

2. *Mist. Mag. Sulph.*:

Saturated solution in water. Attendants to be taught to make this from the salt. Dose 1-4 oz.

3. *Ol. Ricini*.—To be imported.

4. *Mist. Quinine Conc.*:

Quinine hydrochlor. ... grs. 240.

Water ... oz. 12.

Dilute 1 in 4 for use.

Dose of diluted mixture, 1 oz.

(In dispensaries where concentrated stock mixtures may be difficult to be kept supplied the Attendants may be taught to mix the quinine solution by measure of powdered quinine required to make a 5 grains to 1 ounce solution).

5. *Filix Mas. Capsules*:

15 minim capsules. To be imported.

6. *Ol. Chenopodium Capsules*:

5 minim capsules. To be imported.

7. *Mist. Sod. Salicyl. Conc.*:

Sod. salicyl ... grs. 480.

Sod. bicarb ... grs. 960.

Water ... oz. 12.

Dilute 1 in 4 for use. Dose of diluted mixture, 1 oz.

8. *Mist. Expect. Conc.*:

Liq. ammon acet. ... oz. 6.

Acet. ipecac ... dr. 5.

Acet. scillae ... dr. 6.

Water ... oz. 6.

Dilute 1 in 4 with water for use. Dose of diluted mixture, 1 oz.

9. *Mist. Alkalina Conc.*:

Ammon carb. ... grs. 48.

Sod. bicarb ... grs. 160.

Inf. Gent. Co. ... oz. 8.

Water ... oz. 4.

Dilute 1 in 4 with water for use. Dose of diluted mixture, 1 oz.

10. *Mist. Pot. Iodid. Conc.*:

Pot. iodid. ... grs. 450.

Ammon carb. ... grs. 144.

Water ... oz. 12.

Dilute 1 in 4 with water for use. Dose of diluted mixture, 1 oz.

(Attendants to be cautioned not to use this mixture unnecessarily owing to cost of Pot. Iodid).

11. *Creta Prep.*—To be imported.

Dose, half a teaspoonful, followed by a drink of water.

12. *Mist. Tonic Conc.*:

Ferri et ammon. cit. ... grs. 384.

Ammon carb ... grs. 144.

Water ... oz. 12.

To be diluted 1 in 4 for use. Dose of diluted mixture, 1 oz.

13. *Hyd. c̄ Cret.*—To be imported as pills.

14. *Tr. Iodi. Mitis*—To be imported

15. *Protargol Solution*—For conjunctivitis.
Ten *per cent.* in distilled water.
16. *Ung. Hyd. Ox. Flav. (B.P.)*—To be imported.
17. *Ac. Carbolic*—For phagedenic ulcers.
18. *Pot. Permang.:*
Issued in crystal form. Attendants to be taught to **make**
solution for use, judging by colour.
19. *Dusting Powder:*
Ac. boric pulv. dr. 2.
Zinc oxid. dr. 4.
Amyli pulv. dr. 6.
20. *Lotio. Acid Carbolic Conc.:*
1 in 20.
Dilute 1 in 4 for use.
21. *Lotio. Acid Boric*—Saturated solution.
(Attendants to be taught to make up from boric powder).
22. *Ung. Zinci.*
23. *Ung. Sulphuris.*
24. *Ung. Chrysarobin.*
25. *Carron oil.*

OTHER STANDARD EQUIPMENT FOR NATIVE ADMINIS- TRATION DISPENSARIES.

1. Bis. Arsenilate (or other Bismuth Preparation, to be deter-
mined later).
2. N.A.B. (for relapsing fever and for Medical Officers' use
only).
3. Emetine (ampoules containing one grain in each).
4. Alepol or hydnocarpus oil and esters (will be obtainable from
School of Pharmacy, Lagos, per Medical Store, Lagos).
5. Syringes, record—10 cc. (2).
2 cc. (2).
6. Silkworm gut and horsehair sutures.
7. Minor dressing set—probe, forceps, surgical scissors, needle,
lancet (2).
8. Dressing scissors (large) (2).
9. Irrigation apparatus, Bayley's E.I.
10. Spare nozzles for above (4).
11. Syringe, metal, ear.
12. Dressing bowls, E.I. (3), large medium and small.
13. Dressing trays, E.I. (2); kidney trays (2).
14. Carbolised oil for preserving needles of syringes.
15. Gauze, plain.
16. Wool, absorbent.
17. Lint, white.
18. Lint, boric.
19. Jaconet.
20. Bandages 2½ inches.
21. Tow (carbolised).

22. Ointment spreader (bone or zylonite).
23. Pint measure, E.I.
24. Urinal, E.I.
25. Chamber, E.I.
26. Measure Spoons, glazed earthenware (6).
27. Gallipots, E.I., 2 oz. (6).
28. Funnel, E.I., six inches diameter.
29. Thermometers, clinical (3).
30. Eye baths (2).
31. Nail-brushes (2).
32. Overall, white (2).
33. *Khaki knicks (1).
34. *Khaki shirt (1).
35. Sanitary pail (1).
36. White disinfectant fluid to Admiralty specification co-efficient 10 to 11 in five gall. drums for export. (This is as efficient as Izal and costs only 1s. 8d. per gallon).
37. Five gallon water drum *or* brass tap to fit into locally-obtained drum.

**Other Equipment which can be obtained locally through the
Native Administrations, or by local purchase, etc.**

38. Blankets (3).
39. Buckets (2).
40. Saucepan (2).
41. Kettle, large.
42. Basin, hand washing, E.I. (2).
43. Scrubbing brushes (2).
44. Glass cloths (6).
45. Hand towel (2).
46. Carbolic soap (1 lb. per week).
47. Empty petrol tins for boiling water.
48. Empty petrol tins for cleaning ulcers.
49. Native bed (1).
50. Large biscuit tins for storing dressings.
51. Furniture—wooden counter, 2 cupboards, 3 tables, benches for patients, chairs or stools (2).
52. Stationary, ink, etc., as required from Native Administration
Should include stiff brown paper for making eye shades. Also
gum for labels.
53. Simply built incinerator for soiled dressings.

* For North, Wando and Riga obtained through N.A.

N.B. Splints can be made as required by the Native Administration Carpenter.

In some dispensaries a filter may be required if water remains cloudy after boiling and standing to settle. It is not advised otherwise.

The total quantity of each drug required is not indicated as this varies in different localities; e.g. in some a large quantity of Bismuth preparation will be required owing to prevalence of Yaws, in others only a small amount need be ordered. The local Inspecting Medical Officer will advise on these points when the indents are being prepared.

ESTIMATED COST OF STANDARD EQUIPMENT.

(Sent for reference only—Indents will be priced at Headquarters as previously.)

BURGOYNE, BURBIDGE & Co.,
(High St., South, Eastham, London).

	£	s.	d.	£	s.	d.
Lin. Terebinth, 10 lb. ...	0	15	0			
Mag. Sulph., 1 cwt. ...	0	16	0			
Ol. Ricini, 10 cwt. ...	0	10	0			
Quin. Hydrochlor, 4 lb. ...	7	4	0			
Capsules Filis Mas., 15 minim, 1,000 ...	1	15	6			
Capsules Ol. Chenopodium, 5 minims, 500 ...	1	2	0			
Sod. Salicyl, 12 lb. ...	1	14	0			
Pot. Iodid., 1 lb. ...	1	0	0			
Ferri et Ammon. Cit., 6 lb. ...	1	1	6			
Hyd. cum Cret., Pills, 12 gross ...	0	10	0			
Tr. Iodi Mitis, 12 lb. ...	1	14	0			
Protargol, 4 oz. ...	0	12	0			
Acid Carbohcum, 15 lb. ...	1	1	8			
Pot. Permang., 6 lb. ...	0	6	6			
Carron Oil, 2 gall. ...	0	15	0			
Zinc Oxid., 1 lb. ...	0	1	0			
Pulv. Acid Boric., 12 lb. ...	0	9	0			
Pulv. Amyli, 2 lb. ...	0	2	8			
Ung. Zinci, 6 lb. ...	0	10	0			
Ung. Hyd. Ox. Flav., 2 lb. ...	0	2	8			
Ung. Sulph., 12 lb. ...	1	1	10			
Ung. Chrysarobin, 2 lb. ...	0	6	6			
Sod. Bicarb., 12 lb. ...	0	4	0			
Acetum Ipecac., 3 lb. ...	0	7	6			
Acetum Scillae, 12 lb. ...	0	8	0			
Liq. Ammon. Acetatis, 6 lb. ...	0	10	0			
Cret. Prep., 8 lb. ...	0	2	8			
Ammon. Carb., 12 lb. ...	0	7	6			
N.A.B., 0.6 gramme tubes, 50 tubes ...	5	0	0			
Emetine Ampoules, 7 boxes of 10 ampoules ...	1	1	0			
Alepol or Hydnocarpus Oil and Esters ...	Free.					
Bismuth Arsenilate or other Bismuth Prep. say ...	2	10	0			
Carbolised Oil, 1 lb. ...	0	2	0			
Infus. Gent. Co. Conc., 4 lb. ...	0	5	0			
				£34	6	4

SURGICAL MANUFACTURING Co.,
Mortimer St., London.

Syringes, Record, two 10 cc.; two 2 cc. ...	1	6	0
Silkworm Gut, 400 strands ...	0	10	0
Horsechair, 1,000 strands ...	0	10	0

	£	s.	d.	£	s.	d.
Aseptic Pocket Dressing Case (No. 307) ...	1	12	6			
Dressing Scissors (2) ...	0	5	0			
Irrigation Apparatus, Bayley's, E.I. ...	0	5	6			
Spare Nozzles for above, (4) ...	0	5	0			
Metal Ear Syringe, 2 oz., Army pattern ...	0	8	6			
Dressing Bowls, E.I., (2) large, (3) medium, (2) small ...	0	4	6			
Dressing Trays, E.I. (2), Kidney Trays, E.I. (2) ...	0	9	0			
Bone Spatula ...	0	1	0			
Pint Measure, E.I. ...	0	2	9			
Urinal, E.I. ...	0	4	0			
Chamber, E.I. ...	0	1	6			
Measure Spoons, glazed earthenware (6) ...	0	5	0			
Gallipots, E.I., 2 oz. (6) ...	0	6	0			
Funnel, E.I. 6 inch. ...	0	1	9			
Thermometers, Clinical (3) ...	0	5	3			
Eye Baths, glass (2) ...	0	1	0			
Scales and Weights (No. 6,373) for use of M.O. ...	0	15	0			
Nail Brushes (2) ...	0	3	0			
Needles, Suture, 3 pkts. ...	0	2	6			
Measures, glass, for use of M.O., 2 oz. (2) ...	0	3	6			
Measures, glass, for use of M.O., minim (3) ...	0	2	0			
Measures, glass, for use of M.O., 2 dr. ...	0	1	9			
Water Drum, 5 gall., with tap ... say	1	0	0			
Brass Tap for local drum ... say	0	5	0			
Sanitary Pail ...	0	5	0			
Gauze, plain ...	1	0	0			
Wool, absorbent ...	2	0	0			
Lint, white ...	2	0	0			
Lint, boric ...	1	0	0			
Jaconet, 4 yards ...	0	10	0			
Bandages, 2½ inch., 2 gross ...	2	2	6			
Tow, carbolised, 6 lb. ...	0	10	0			
White Disinfectant Fluid, 2-5 gallon drums	0	16	6			
Overall (2) ...	0	4	0			
Khaki Knicks ...	0	5	0			
Khaki Shirt ...	0	5	0			
				£20	15	6

Local Purchase and through N.A's.

	£	s.	d.	£	s.	d.
Items 38-50 ... say	5	0	0			
Furniture, etc. ... say	10	0	0			
Incinerator ... say	1	0	0			
				16	0	0
Total ...	£71	1	10			

